I SEMANA DAS ENGENHARIAS DO INSTITUTO POLITÉCNICO

CONHECENDO O MAPLE

(Versão 13)

por

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I. O que é Maple?

Os *sistemas de computação algébrica* (Computer Algebraic Systems ou CAS), também conhecidos como *sistemas de computação simbólica* têm por objetivo a automatização de cálculos matemáticos em geral. Isto é é especialmente útil quando tais cálculos envolvem um grande número de operações repetitivas e expressões de tamanho muito grande, em que o tempo necessário para realizá-las é muito extenso, e a probabilidade de erro humano durante a sua realização é muito alta.

Exemplo: Utilizando o comando *diff* do Maple, calcular a derivada de 20a. ordem da função $\sin\left(x\,e^{x}\right)$.

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> diff(sin(x*exp(x)),x$20);
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$$\cos\left(x\,e^{x}\right)\left(20\,e^{x}+x\,e^{x}\right)+\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{20}-1466593128000\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{2}\left(3\,e^{x}+x\,e^{x}\right)^{2}\left(5\,e^{x}+x\,e^{x}\right)\left(4\,e^{x}+x\,e^{x}\right)-733296564000\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{2}\left(2\,e^{x}+x\,e^{x}\right)\left(3\,e^{x}+x\,e^{x}\right)\left(5\,e^{x}+x\,e^{x}\right)\left(4\,e^{x}+x\,e^{x}\right)^{2}-139675536000\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)\left(3\,e^{x}+x\,e^{x}\right)^{2}\left(7\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)\left(4\,e^{x}+x\,e^{x}\right)-209513304000\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{2}\left(3\,e^{x}+x\,e^{x}\right)\left(7\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{2}\left(4\,e^{x}+x\,e^{x}\right)+733296564000\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{4}\left(2\,e^{x}+x\,e^{x}\right)^{2}\left(3\,e^{x}+x\,e^{x}\right)\left(5\,e^{x}+x\,e^{x}\right)\left(4\,e^{x}+x\,e^{x}\right)-55870214400\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{3}\left(3\,e^{x}+x\,e^{x}\right)\left(7\,e^{x}+x\,e^{x}\right)\left(5\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)+14108640\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{6}\left(11\,e^{x}+x\,e^{x}\right)\left(3\,e^{x}+x\,e^{x}\right)-55426800\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{4}\left(7\,e^{x}+x\,e^{x}\right)\left(9\,e^{x}+x\,e^{x}\right)+5426400\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)\left(3\,e^{x}+x\,e^{x}\right)^{2}\left(13\,e^{x}+x\,e^{x}\right)-14108640\cos\left(x\,e^{x}\right)\left(3\,e^{x}+x\,e^{x}\right)\left(6\,e^{x}+x\,e^{x}\right)\left(11\,e^{x}+x\,e^{x}\right)-8817900\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{4}\left(12\,e^{x}+x\,e^{x}\right)\left(4\,e^{x}+x\,e^{x}\right)+8139600\sin\left(x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{2}\left(13\,e^{x}+x\,e^{x}\right)\left(3\,e^{x}+x\,e^{x}\right)+8139600\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{3}\left(13\,e^{x}+x\,e^{x}\right) \tag{1.1}$$

$$+1939938000\sin(x\,e^x)\,(e^x+x\,e^x)^8\,(3\,e^x+x\,e^x)^4-4408950\sin(x\,e^x)\,(e^x$$
$$+x\,e^x)^{12}\,(4\,e^x+x\,e^x)^2+290990700\cos(x\,e^x)\,(e^x+x\,e^x)^2\,(4\,e^x+x\,e^x)^2\,(10\,e^x$$
$$+x\,e^x)+9820936125\cos(x\,e^x)\,(2\,e^x+x\,e^x)^8\,(4\,e^x+x\,e^x)$$
$$+5237832600\sin(x\,e^x)\,(2\,e^x+x\,e^x)^7\,(6\,e^x+x\,e^x)-174594420\sin(x\,e^x)\,(2\,e^x$$
$$+x\,e^x)^5\,(10\,e^x+x\,e^x)-1309458150\cos(x\,e^x)\,(2\,e^x+x\,e^x)^6\,(8\,e^x+x\,e^x)$$
$$+488864376\sin(x\,e^x)\,(5\,e^x+x\,e^x)^4+12730843125\sin(x\,e^x)\,(e^x+x\,e^x)^4\,(4\,e^x$$
$$+x\,e^x)^4+66512160\sin(x\,e^x)\,(e^x+x\,e^x)^6\,(7\,e^x+x\,e^x)^2-47028800\sin(x\,e^x)\,(e^x$$
$$+x\,e^x)^{11}\,(3\,e^x+x\,e^x)^3+77520\sin(x\,e^x)\,(e^x+x\,e^x)^7\,(13\,e^x+x\,e^x)$$
$$-167960\sin(x\,e^x)\,(e^x+x\,e^x)^9\,(11\,e^x+x\,e^x)-654729075\sin(x\,e^x)\,(2\,e^x+x\,e^x)^{10}$$
$$+13226850\cos(x\,e^x)\,(2\,e^x+x\,e^x)^4\,(12\,e^x+x\,e^x)-4408950\cos(x\,e^x)\,(4\,e^x$$
$$+x\,e^x)^2\,(12\,e^x+x\,e^x)+727476750\sin(x\,e^x)\,(4\,e^x+x\,e^x)^3\,(8\,e^x+x\,e^x)$$
$$+2546168625\cos(x\,e^x)\,(4\,e^x+x\,e^x)^5+47028800\sin(x\,e^x)\,(3\,e^x+x\,e^x)^3\,(11\,e^x$$
$$+x\,e^x)+1939938000\cos(x\,e^x)\,(3\,e^x+x\,e^x)^4\,(8\,e^x+x\,e^x)$$
$$-21727305600\sin(x\,e^x)\,(3\,e^x+x\,e^x)^5\,(5\,e^x+x\,e^x)-36212176000\cos(x\,e^x)\,(2\,e^x$$
$$+x\,e^x)\,(3\,e^x+x\,e^x)^6+36212176000\sin(x\,e^x)\,(e^x+x\,e^x)^2\,(3\,e^x+x\,e^x)^6$$
$$-31177575\sin(x\,e^x)\,(e^x+x\,e^x)^4\,(8\,e^x+x\,e^x)^2-20\sin(x\,e^x)\,(e^x+x\,e^x)\,(19\,e^x$$
$$+x\,e^x)-190\sin(x\,e^x)\,(2\,e^x+x\,e^x)\,(18\,e^x+x\,e^x)-1140\sin(x\,e^x)\,(e^x$$
$$+x\,e^x)^{17}\,(3\,e^x+x\,e^x)-1140\sin(x\,e^x)\,(3\,e^x+x\,e^x)\,(17\,e^x+x\,e^x)$$
$$-4845\sin(x\,e^x)\,(4\,e^x+x\,e^x)\,(16\,e^x+x\,e^x)+15504\sin(x\,e^x)\,(e^x+x\,e^x)^{15}\,(5\,e^x$$
$$+x\,e^x)+167960\sin(x\,e^x)\,(e^x+x\,e^x)^{11}\,(9\,e^x+x\,e^x)-23279256\cos(x\,e^x)\,(5\,e^x$$
$$+x\,e^x)^2\,(10\,e^x+x\,e^x)-92378\sin(x\,e^x)\,(10\,e^x+x\,e^x)^2-167960\sin(x\,e^x)\,(9\,e^x$$
$$+x\,e^x)\,(11\,e^x+x\,e^x)-4618900\cos(x\,e^x)\,(2\,e^x+x\,e^x)\,(9\,e^x+x\,e^x)^2$$
$$+4618900\sin(x\,e^x)\,(e^x+x\,e^x)^2\,(9\,e^x+x\,e^x)^2-125970\sin(x\,e^x)\,(8\,e^x+x\,e^x)\,(12\,e^x$$
$$+x\,e^x)-31177575\cos(x\,e^x)\,(4\,e^x+x\,e^x)\,(8\,e^x+x\,e^x)^2-77520\sin(x\,e^x)\,(7\,e^x$$
$$+x\,e^x)\,(13\,e^x+x\,e^x)-15504\sin(x\,e^x)\,(5\,e^x+x\,e^x)\,(15\,e^x+x\,e^x)$$
$$-38760\cos(x\,e^x)\,(e^x+x\,e^x)^{14}\,(6\,e^x+x\,e^x)-38760\sin(x\,e^x)\,(6\,e^x+x\,e^x)\,(14\,e^x$$
$$+x\,e^x)-77520\sin(x\,e^x)\,(e^x+x\,e^x)^{13}\,(7\,e^x+x\,e^x)-14535\cos(x\,e^x)\,(2\,e^x$$
$$+x\,e^x)^2\,(16\,e^x+x\,e^x)+4845\cos(x\,e^x)\,(e^x+x\,e^x)^4\,(16\,e^x+x\,e^x)$$
$$-15504\sin(x\,e^x)\,(e^x+x\,e^x)^5\,(15\,e^x+x\,e^x)+1140\sin(x\,e^x)\,(e^x+x\,e^x)^3\,(17\,e^x$$
$$+x\,e^x)+1163962800\sin(x\,e^x)\,(e^x+x\,e^x)^5\,(4\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)\,(9\,e^x+x\,e^x)$$
$$-58198140\sin(x\,e^x)\,(e^x+x\,e^x)^8\,(6\,e^x+x\,e^x)^2-366648282000\cos(x\,e^x)\,(2\,e^x$$

$$+x\,e^x)^4\,(3\,e^x+x\,e^x)\,(5\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)-366648282000\cos(x\,e^x)\,(e^x$$
$$+x\,e^x)\,(2\,e^x+x\,e^x)^3\,(4\,e^x+x\,e^x)^2\,(5\,e^x+x\,e^x)-488864376000\cos(x\,e^x)\,(e^x$$
$$+x\,e^x)\,(2\,e^x+x\,e^x)^3\,(3\,e^x+x\,e^x)\,(6\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)$$
$$-293318625600\cos(x\,e^x)\,(e^x+x\,e^x)\,(2\,e^x+x\,e^x)^3\,(3\,e^x+x\,e^x)\,(5\,e^x+x\,e^x)^2$$
$$+1466593128000\sin(x\,e^x)\,(e^x+x\,e^x)^2\,(2\,e^x+x\,e^x)^3\,(3\,e^x+x\,e^x)\,(5\,e^x+x\,e^x)\,(4\,e^x$$
$$+x\,e^x)-325909584000\cos(x\,e^x)\,(e^x+x\,e^x)^2\,(3\,e^x+x\,e^x)^3\,(5\,e^x+x\,e^x)\,(4\,e^x$$
$$+x\,e^x)-488864376000\cos(x\,e^x)\,(e^x+x\,e^x)^2\,(2\,e^x+x\,e^x)\,(3\,e^x+x\,e^x)^2\,(6\,e^x$$
$$+x\,e^x)\,(4\,e^x+x\,e^x)-293318625600\cos(x\,e^x)\,(e^x+x\,e^x)^2\,(2\,e^x+x\,e^x)\,(3\,e^x$$
$$+x\,e^x)^2\,(5\,e^x+x\,e^x)^2+977728752000\sin(x\,e^x)\,(e^x+x\,e^x)^3\,(2\,e^x+x\,e^x)\,(3\,e^x$$
$$+x\,e^x)^2\,(5\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)-69837768000\sin(x\,e^x)\,(2\,e^x+x\,e^x)^3\,(3\,e^x$$
$$+x\,e^x)\,(7\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)-52378326000\sin(x\,e^x)\,(e^x+x\,e^x)\,(4\,e^x$$
$$+x\,e^x)^2\,(7\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)^2-52378326000\sin(x\,e^x)\,(e^x+x\,e^x)\,(3\,e^x$$
$$+x\,e^x)\,(8\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)^2\,(4\,e^x+x\,e^x)-83805321600\sin(x\,e^x)\,(e^x$$
$$+x\,e^x)\,(3\,e^x+x\,e^x)\,(7\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)^2\,(5\,e^x+x\,e^x)$$
$$+97772875200\sin(x\,e^x)\,(e^x+x\,e^x)^3\,(5\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)^3\,(6\,e^x+x\,e^x)$$
$$+97772875200\sin(x\,e^x)\,(e^x+x\,e^x)^4\,(5\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)\,(6\,e^x+x\,e^x)\,(3\,e^x$$
$$+x\,e^x)+29331862560\cos(x\,e^x)\,(e^x+x\,e^x)^5\,(5\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)^2\,(6\,e^x+x\,e^x)$$
$$-219988969200\cos(x\,e^x)\,(e^x+x\,e^x)^2\,(2\,e^x+x\,e^x)^2\,(4\,e^x+x\,e^x)\,(5\,e^x+x\,e^x)^2$$
$$-293318625600\cos(x\,e^x)\,(e^x+x\,e^x)^2\,(2\,e^x+x\,e^x)^2\,(3\,e^x+x\,e^x)\,(6\,e^x+x\,e^x)\,(5\,e^x$$
$$+x\,e^x)+488864376000\sin(x\,e^x)\,(e^x+x\,e^x)^3\,(2\,e^x+x\,e^x)^2\,(3\,e^x+x\,e^x)\,(6\,e^x$$
$$+x\,e^x)\,(4\,e^x+x\,e^x)-581981400\cos(x\,e^x)\,(e^x+x\,e^x)^4\,(4\,e^x+x\,e^x)\,(2\,e^x$$
$$+x\,e^x)\,(10\,e^x+x\,e^x)+38798760\sin(x\,e^x)\,(e^x+x\,e^x)^{10}\,(6\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)$$
$$+23279256\sin(x\,e^x)\,(e^x+x\,e^x)^{10}\,(5\,e^x+x\,e^x)^2+16295479200\cos(x\,e^x)\,(2\,e^x$$
$$+x\,e^x)\,(3\,e^x+x\,e^x)^2\,(6\,e^x+x\,e^x)^2-16295479200\sin(x\,e^x)\,(e^x+x\,e^x)^2\,(3\,e^x$$
$$+x\,e^x)^2\,(6\,e^x+x\,e^x)^2+2036934900\sin(x\,e^x)\,(4\,e^x+x\,e^x)^2\,(6\,e^x+x\,e^x)^2$$
$$+3259095840\sin(x\,e^x)\,(3\,e^x+x\,e^x)\,(6\,e^x+x\,e^x)^2\,(5\,e^x+x\,e^x)$$
$$+1163962800\sin(x\,e^x)\,(3\,e^x+x\,e^x)^2\,(8\,e^x+x\,e^x)\,(6\,e^x+x\,e^x)$$
$$+665121600\sin(x\,e^x)\,(3\,e^x+x\,e^x)^2\,(7\,e^x+x\,e^x)^2+36664828200\sin(x\,e^x)\,(e^x$$
$$+x\,e^x)^6\,(2\,e^x+x\,e^x)^5\,(4\,e^x+x\,e^x)-190\cos(x\,e^x)\,(e^x+x\,e^x)^2\,(18\,e^x+x\,e^x)$$
$$-14535\sin(x\,e^x)\,(e^x+x\,e^x)^{16}\,(2\,e^x+x\,e^x)^2-190\cos(x\,e^x)\,(e^x+x\,e^x)^{18}\,(2\,e^x$$
$$+x\,e^x)-3420\cos(x\,e^x)\,(e^x+x\,e^x)\,(2\,e^x+x\,e^x)\,(17\,e^x+x\,e^x)-19380\cos(x\,e^x)\,(e^x$$

$$+x\,e^x)\,(3\,e^x+x\,e^x)\,(16\,e^x+x\,e^x)+581400\sin(x\,e^x)\,(e^x+x\,e^x)^{14}\,(4\,e^x+x\,e^x)\,(2\,e^x$$
$$+x\,e^x)+4845\cos(x\,e^x)\,(e^x+x\,e^x)^{16}\,(4\,e^x+x\,e^x)+8314020\sin(x\,e^x)\,(e^x$$
$$+x\,e^x)^{10}\,(8\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)+125970\cos(x\,e^x)\,(e^x+x\,e^x)^{12}\,(8\,e^x+x\,e^x)$$
$$-77597520\cos(x\,e^x)\,(5\,e^x+x\,e^x)\,(9\,e^x+x\,e^x)\,(6\,e^x+x\,e^x)$$
$$+232792560\sin(x\,e^x)\,(e^x+x\,e^x)\,(5\,e^x+x\,e^x)^2\,(9\,e^x+x\,e^x)-1847560\cos(x\,e^x)\,(e^x$$
$$+x\,e^x)\,(9\,e^x+x\,e^x)\,(10\,e^x+x\,e^x)-1511640\cos(x\,e^x)\,(e^x+x\,e^x)\,(8\,e^x$$
$$+x\,e^x)\,(11\,e^x+x\,e^x)-27713400\cos(x\,e^x)\,(3\,e^x+x\,e^x)\,(8\,e^x+x\,e^x)\,(9\,e^x+x\,e^x)$$
$$+124710300\sin(x\,e^x)\,(e^x+x\,e^x)\,(3\,e^x+x\,e^x)\,(8\,e^x+x\,e^x)^2-1007760\cos(x\,e^x)\,(e^x$$
$$+x\,e^x)\,(7\,e^x+x\,e^x)\,(12\,e^x+x\,e^x)-77520\cos(x\,e^x)\,(e^x+x\,e^x)\,(4\,e^x+x\,e^x)\,(15\,e^x$$
$$+x\,e^x)-1627920\cos(x\,e^x)\,(e^x+x\,e^x)^{13}\,(5\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)$$
$$-542640\cos(x\,e^x)\,(e^x+x\,e^x)\,(6\,e^x+x\,e^x)\,(13\,e^x+x\,e^x)-232560\cos(x\,e^x)\,(e^x$$
$$+x\,e^x)\,(5\,e^x+x\,e^x)\,(14\,e^x+x\,e^x)-3527160\sin(x\,e^x)\,(e^x+x\,e^x)^{12}\,(6\,e^x$$
$$+x\,e^x)\,(2\,e^x+x\,e^x)-155040\cos(x\,e^x)\,(2\,e^x+x\,e^x)\,(15\,e^x+x\,e^x)\,(3\,e^x+x\,e^x)$$
$$+232560\sin(x\,e^x)\,(e^x+x\,e^x)\,(2\,e^x+x\,e^x)^2\,(15\,e^x+x\,e^x)$$
$$+155040\cos(x\,e^x)\,(e^x+x\,e^x)^3\,(15\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)$$
$$-581400\sin(x\,e^x)\,(e^x+x\,e^x)^4\,(14\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)-38760\cos(x\,e^x)\,(e^x$$
$$+x\,e^x)^6\,(14\,e^x+x\,e^x)+29070\sin(x\,e^x)\,(e^x+x\,e^x)^2\,(16\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)$$
$$+3527160\sin(x\,e^x)\,(e^x+x\,e^x)^6\,(12\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)$$
$$+125970\cos(x\,e^x)\,(e^x+x\,e^x)^8\,(12\,e^x+x\,e^x)+6046560\cos(x\,e^x)\,(e^x+x\,e^x)^7\,(11\,e^x$$
$$+x\,e^x)\,(2\,e^x+x\,e^x)-8314020\sin(x\,e^x)\,(e^x+x\,e^x)^8\,(10\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)$$
$$-184756\cos(x\,e^x)\,(e^x+x\,e^x)^{10}\,(10\,e^x+x\,e^x)+9820936125\sin(x\,e^x)\,(e^x$$
$$+x\,e^x)^4\,(2\,e^x+x\,e^x)^8+5237832600\cos(x\,e^x)\,(e^x+x\,e^x)^6\,(2\,e^x+x\,e^x)^7$$
$$-20369349000\sin(x\,e^x)\,(e^x+x\,e^x)^6\,(4\,e^x+x\,e^x)^3\,(2\,e^x+x\,e^x)$$
$$-3491888400\sin(x\,e^x)\,(e^x+x\,e^x)^7\,(4\,e^x+x\,e^x)^2\,(5\,e^x+x\,e^x)$$
$$-727476750\cos(x\,e^x)\,(e^x+x\,e^x)^8\,(4\,e^x+x\,e^x)^3-9237800\cos(x\,e^x)\,(e^x$$
$$+x\,e^x)^9\,(9\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)-39283744500\sin(x\,e^x)\,(e^x+x\,e^x)\,(2\,e^x$$
$$+x\,e^x)^8\,(3\,e^x+x\,e^x)-6547290750\cos(x\,e^x)\,(e^x+x\,e^x)^2\,(2\,e^x+x\,e^x)^9$$
$$+211629600\cos(x\,e^x)\,(2\,e^x+x\,e^x)^3\,(11\,e^x+x\,e^x)\,(3\,e^x+x\,e^x)$$
$$-158722200\sin(x\,e^x)\,(e^x+x\,e^x)\,(2\,e^x+x\,e^x)^4\,(11\,e^x+x\,e^x)$$
$$-21162960\cos(x\,e^x)\,(4\,e^x+x\,e^x)\,(11\,e^x+x\,e^x)\,(5\,e^x+x\,e^x)$$
$$+52907400\sin(x\,e^x)\,(e^x+x\,e^x)\,(4\,e^x+x\,e^x)^2\,(11\,e^x+x\,e^x)$$
$$+3491888400\sin(x\,e^x)\,(4\,e^x+x\,e^x)^2\,(7\,e^x+x\,e^x)\,(5\,e^x+x\,e^x)$$

$$
\begin{aligned}
&+ 5819814000 \cos(x\,e^x)\,(e^x + x\,e^x)\,(4\,e^x + x\,e^x)^3\,(7\,e^x + x\,e^x) \\
&+ 40738698000 \cos(x\,e^x)\,(3\,e^x + x\,e^x)\,(4\,e^x + x\,e^x)^3\,(5\,e^x + x\,e^x) \\
&- 50923372500 \sin(x\,e^x)\,(e^x + x\,e^x)\,(3\,e^x + x\,e^x)\,(4\,e^x + x\,e^x)^4 \\
&+ 387987600 \sin(x\,e^x)\,(3\,e^x + x\,e^x)^2\,(10\,e^x + x\,e^x)\,(4\,e^x + x\,e^x) \\
&+ 517316800 \cos(x\,e^x)\,(e^x + x\,e^x)\,(3\,e^x + x\,e^x)^3\,(10\,e^x + x\,e^x) \\
&+ 15519504000 \cos(x\,e^x)\,(3\,e^x + x\,e^x)^3\,(7\,e^x + x\,e^x)\,(4\,e^x + x\,e^x) \\
&- 15519504000 \sin(x\,e^x)\,(e^x + x\,e^x)\,(3\,e^x + x\,e^x)^4\,(7\,e^x + x\,e^x) \\
&- 67897830000 \sin(x\,e^x)\,(3\,e^x + x\,e^x)^4\,(4\,e^x + x\,e^x)^2 - 108636528000 \cos(x\,e^x)\,(e^x \\
&+ x\,e^x)\,(3\,e^x + x\,e^x)^5\,(4\,e^x + x\,e^x) + 997682400 \cos(x\,e^x)\,(e^x + x\,e^x)^2\,(7\,e^x \\
&+ x\,e^x)^2\,(4\,e^x + x\,e^x) - 1330243200 \sin(x\,e^x)\,(e^x + x\,e^x)^3\,(7\,e^x + x\,e^x)^2\,(3\,e^x + x\,e^x) \\
&+ 387600 \sin(x\,e^x)\,(e^x + x\,e^x)^{14}\,(3\,e^x + x\,e^x)^2 + 22170720 \sin(x\,e^x)\,(e^x \\
&+ x\,e^x)^{10}\,(7\,e^x + x\,e^x)\,(3\,e^x + x\,e^x) - 58198140 \cos(x\,e^x)\,(6\,e^x + x\,e^x)^2\,(8\,e^x + x\,e^x) \\
&- 99768240 \cos(x\,e^x)\,(5\,e^x + x\,e^x)\,(8\,e^x + x\,e^x)\,(7\,e^x + x\,e^x) \\
&+ 1047566520 \sin(x\,e^x)\,(2\,e^x + x\,e^x)\,(5\,e^x + x\,e^x)^2\,(8\,e^x + x\,e^x) \\
&- 8314020 \cos(x\,e^x)\,(2\,e^x + x\,e^x)\,(8\,e^x + x\,e^x)\,(10\,e^x + x\,e^x) \\
&+ 8314020 \sin(x\,e^x)\,(e^x + x\,e^x)^2\,(8\,e^x + x\,e^x)\,(10\,e^x + x\,e^x) \\
&+ 93532725 \sin(x\,e^x)\,(2\,e^x + x\,e^x)^2\,(8\,e^x + x\,e^x)^2 - 6046560 \cos(x\,e^x)\,(2\,e^x \\
&+ x\,e^x)\,(7\,e^x + x\,e^x)\,(11\,e^x + x\,e^x) + 6046560 \sin(x\,e^x)\,(e^x + x\,e^x)^2\,(7\,e^x \\
&+ x\,e^x)\,(11\,e^x + x\,e^x) + 155040 \sin(x\,e^x)\,(e^x + x\,e^x)^2\,(3\,e^x + x\,e^x)\,(15\,e^x + x\,e^x) \\
&- 2713200 \cos(x\,e^x)\,(e^x + x\,e^x)^{13}\,(4\,e^x + x\,e^x)\,(3\,e^x + x\,e^x) \\
&- 3527160 \cos(x\,e^x)\,(2\,e^x + x\,e^x)\,(6\,e^x + x\,e^x)\,(12\,e^x + x\,e^x) \\
&+ 3527160 \sin(x\,e^x)\,(e^x + x\,e^x)^2\,(6\,e^x + x\,e^x)\,(12\,e^x + x\,e^x) \\
&- 1627920 \cos(x\,e^x)\,(2\,e^x + x\,e^x)\,(5\,e^x + x\,e^x)\,(13\,e^x + x\,e^x) \\
&+ 1627920 \sin(x\,e^x)\,(e^x + x\,e^x)^2\,(5\,e^x + x\,e^x)\,(13\,e^x + x\,e^x) - 581400 \cos(x\,e^x)\,(2\,e^x \\
&+ x\,e^x)\,(4\,e^x + x\,e^x)\,(14\,e^x + x\,e^x) + 581400 \sin(x\,e^x)\,(e^x + x\,e^x)^2\,(4\,e^x \\
&+ x\,e^x)\,(14\,e^x + x\,e^x) - 7054320 \sin(x\,e^x)\,(e^x + x\,e^x)^{12}\,(5\,e^x + x\,e^x)\,(3\,e^x + x\,e^x) \\
&- 387600 \cos(x\,e^x)\,(3\,e^x + x\,e^x)^2\,(14\,e^x + x\,e^x) + 581400 \sin(x\,e^x)\,(2\,e^x \\
&+ x\,e^x)^3\,(14\,e^x + x\,e^x) + 775200 \cos(x\,e^x)\,(e^x + x\,e^x)^3\,(14\,e^x + x\,e^x)\,(3\,e^x + x\,e^x) \\
&- 2713200 \sin(x\,e^x)\,(e^x + x\,e^x)^4\,(13\,e^x + x\,e^x)\,(3\,e^x + x\,e^x) \\
&+ 108636528000 \sin(x\,e^x)\,(e^x + x\,e^x)^3\,(3\,e^x + x\,e^x)^4\,(5\,e^x + x\,e^x) \\
&+ 21727305600 \cos(x\,e^x)\,(3\,e^x + x\,e^x)^3\,(6\,e^x + x\,e^x)\,(5\,e^x + x\,e^x)
\end{aligned}
$$

$$+48886437600\cos(x\,e^x)\,(3\,e^x+x\,e^x)^2\,(5\,e^x+x\,e^x)^2\,(4\,e^x+x\,e^x)$$
$$+20369349000\cos(x\,e^x)\,(2\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)^3\,(6\,e^x+x\,e^x)$$
$$-20369349000\sin(x\,e^x)\,(e^x+x\,e^x)^2\,(4\,e^x+x\,e^x)^3\,(6\,e^x+x\,e^x)$$
$$+19554575040\cos(x\,e^x)\,(2\,e^x+x\,e^x)\,(5\,e^x+x\,e^x)^3\,(3\,e^x+x\,e^x)$$
$$-29331862560\sin(x\,e^x)\,(e^x+x\,e^x)\,(2\,e^x+x\,e^x)^2\,(5\,e^x+x\,e^x)^3$$
$$-19554575040\sin(x\,e^x)\,(e^x+x\,e^x)^2\,(3\,e^x+x\,e^x)\,(5\,e^x+x\,e^x)^3$$
$$+133024320\cos(x\,e^x)\,(e^x+x\,e^x)^7\,(6\,e^x+x\,e^x)\,(7\,e^x+x\,e^x)$$
$$+99768240\cos(x\,e^x)\,(e^x+x\,e^x)^7\,(5\,e^x+x\,e^x)\,(8\,e^x+x\,e^x)$$
$$-99768240\sin(x\,e^x)\,(e^x+x\,e^x)^8\,(5\,e^x+x\,e^x)\,(7\,e^x+x\,e^x)$$
$$+55426800\cos(x\,e^x)\,(e^x+x\,e^x)^7\,(4\,e^x+x\,e^x)\,(9\,e^x+x\,e^x)$$
$$-62355150\sin(x\,e^x)\,(e^x+x\,e^x)^8\,(4\,e^x+x\,e^x)\,(8\,e^x+x\,e^x)$$
$$+22170720\cos(x\,e^x)\,(e^x+x\,e^x)^7\,(3\,e^x+x\,e^x)\,(10\,e^x+x\,e^x)$$
$$-27713400\sin(x\,e^x)\,(e^x+x\,e^x)^8\,(3\,e^x+x\,e^x)\,(9\,e^x+x\,e^x)$$
$$+13226850\sin(x\,e^x)\,(e^x+x\,e^x)^{12}\,(2\,e^x+x\,e^x)^4+581400\cos(x\,e^x)\,(e^x$$
$$+x\,e^x)^{14}\,(2\,e^x+x\,e^x)^3-66512160\cos(x\,e^x)\,(6\,e^x+x\,e^x)\,(7\,e^x+x\,e^x)^2$$
$$+465585120\sin(x\,e^x)\,(e^x+x\,e^x)\,(6\,e^x+x\,e^x)^2\,(7\,e^x+x\,e^x)$$
$$+399072960\sin(x\,e^x)\,(e^x+x\,e^x)\,(5\,e^x+x\,e^x)\,(7\,e^x+x\,e^x)^2$$
$$+2793510720\sin(x\,e^x)\,(3\,e^x+x\,e^x)\,(5\,e^x+x\,e^x)^2\,(7\,e^x+x\,e^x)$$
$$-22170720\cos(x\,e^x)\,(3\,e^x+x\,e^x)\,(7\,e^x+x\,e^x)\,(10\,e^x+x\,e^x)$$
$$-35271600\cos(x\,e^x)\,(e^x+x\,e^x)^{12}\,(3\,e^x+x\,e^x)^2\,(2\,e^x+x\,e^x)$$
$$-7054320\cos(x\,e^x)\,(3\,e^x+x\,e^x)\,(5\,e^x+x\,e^x)\,(12\,e^x+x\,e^x)$$
$$-2713200\cos(x\,e^x)\,(3\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)\,(13\,e^x+x\,e^x)$$
$$+1163962800\sin(x\,e^x)\,(e^x+x\,e^x)^9\,(5\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)$$
$$+21162960\cos(x\,e^x)\,(e^x+x\,e^x)^{11}\,(5\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)$$
$$+16295479200\cos(x\,e^x)\,(e^x+x\,e^x)\,(3\,e^x+x\,e^x)\,(6\,e^x+x\,e^x)^2\,(4\,e^x+x\,e^x)$$
$$+9311702400\cos(x\,e^x)\,(e^x+x\,e^x)\,(3\,e^x+x\,e^x)^2\,(6\,e^x+x\,e^x)\,(7\,e^x+x\,e^x)$$
$$+4655851200\sin(x\,e^x)\,(3\,e^x+x\,e^x)\,(6\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)\,(7\,e^x+x\,e^x)$$
$$+12221609400\sin(x\,e^x)\,(e^x+x\,e^x)^4\,(6\,e^x+x\,e^x)^2\,(2\,e^x+x\,e^x)^2$$
$$+20951330400\sin(x\,e^x)\,(e^x+x\,e^x)^4\,(5\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)^2\,(7\,e^x+x\,e^x)$$
$$+73329656400\sin(x\,e^x)\,(e^x+x\,e^x)^5\,(2\,e^x+x\,e^x)^6\,(3\,e^x+x\,e^x)$$
$$+122216094000\sin(x\,e^x)\,(e^x+x\,e^x)^6\,(2\,e^x+x\,e^x)^4\,(3\,e^x+x\,e^x)^2$$

$$
\begin{aligned}
&+ 20951330400 \cos(x e^x) \left(e^x + x e^x\right)^7 \left(2 e^x + x e^x\right)^5 \left(3 e^x + x e^x\right) \\
&- 183324141000 \cos(x e^x) \left(e^x + x e^x\right)^2 \left(2 e^x + x e^x\right)^2 \left(4 e^x + x e^x\right)^2 \left(6 e^x + x e^x\right) \\
&+ 366648282000 \sin(x e^x) \left(e^x + x e^x\right)^3 \left(2 e^x + x e^x\right)^2 \left(4 e^x + x e^x\right)^2 \left(5 e^x + x e^x\right) \\
&+ 293318625600 \sin(x e^x) \left(e^x + x e^x\right)^3 \left(2 e^x + x e^x\right)^2 \left(3 e^x + x e^x\right) \left(5 e^x + x e^x\right)^2 \\
&- 122216094000 \cos(x e^x) \left(2 e^x + x e^x\right)^4 \left(3 e^x + x e^x\right)^2 \left(6 e^x + x e^x\right) \\
&- 139675536000 \cos(x e^x) \left(e^x + x e^x\right) \left(2 e^x + x e^x\right)^3 \left(3 e^x + x e^x\right)^2 \left(7 e^x + x e^x\right) \\
&+ 488864376000 \sin(x e^x) \left(e^x + x e^x\right)^2 \left(2 e^x + x e^x\right)^3 \left(3 e^x + x e^x\right)^2 \left(6 e^x + x e^x\right) \\
&- 54318264000 \cos(x e^x) \left(e^x + x e^x\right)^2 \left(3 e^x + x e^x\right)^4 \left(6 e^x + x e^x\right) \\
&- 93117024000 \cos(x e^x) \left(e^x + x e^x\right)^2 \left(2 e^x + x e^x\right) \left(3 e^x + x e^x\right)^3 \left(7 e^x + x e^x\right) \\
&+ 217273056000 \sin(x e^x) \left(e^x + x e^x\right)^3 \left(2 e^x + x e^x\right) \left(3 e^x + x e^x\right)^3 \left(6 e^x + x e^x\right) \\
&+ 20951330400 \cos(x e^x) \left(e^x + x e^x\right)^5 \left(4 e^x + x e^x\right) \left(2 e^x + x e^x\right)^2 \left(7 e^x + x e^x\right) \\
&- 24443218800 \sin(x e^x) \left(e^x + x e^x\right)^6 \left(4 e^x + x e^x\right) \left(2 e^x + x e^x\right)^2 \left(6 e^x + x e^x\right) \\
&+ 73329656400 \sin(x e^x) \left(2 e^x + x e^x\right)^6 \left(3 e^x + x e^x\right) \left(5 e^x + x e^x\right) \\
&+ 219988969200 \sin(x e^x) \left(e^x + x e^x\right) \left(2 e^x + x e^x\right)^5 \left(4 e^x + x e^x\right) \left(5 e^x + x e^x\right) \\
&+ 146659312800 \sin(x e^x) \left(e^x + x e^x\right) \left(2 e^x + x e^x\right)^5 \left(3 e^x + x e^x\right) \left(6 e^x + x e^x\right) \\
&+ 366648282000 \cos(x e^x) \left(e^x + x e^x\right)^3 \left(2 e^x + x e^x\right)^4 \left(4 e^x + x e^x\right) \left(5 e^x + x e^x\right) \\
&+ 244432188000 \cos(x e^x) \left(e^x + x e^x\right)^3 \left(2 e^x + x e^x\right)^4 \left(3 e^x + x e^x\right) \left(6 e^x + x e^x\right) \\
&- 366648282000 \sin(x e^x) \left(e^x + x e^x\right)^4 \left(2 e^x + x e^x\right)^4 \left(3 e^x + x e^x\right) \left(5 e^x + x e^x\right) \\
&+ 20951330400 \cos(x e^x) \left(2 e^x + x e^x\right)^2 \left(4 e^x + x e^x\right) \left(7 e^x + x e^x\right) \left(5 e^x + x e^x\right) \\
&+ 10475665200 \cos(x e^x) \left(2 e^x + x e^x\right)^2 \left(3 e^x + x e^x\right) \left(8 e^x + x e^x\right) \left(5 e^x + x e^x\right) \\
&+ 13967553600 \cos(x e^x) \left(2 e^x + x e^x\right)^2 \left(3 e^x + x e^x\right) \left(7 e^x + x e^x\right) \left(6 e^x + x e^x\right) \\
&- 27935107200 \sin(x e^x) \left(e^x + x e^x\right)^2 \left(3 e^x + x e^x\right)^2 \left(7 e^x + x e^x\right) \left(5 e^x + x e^x\right) \\
&- 146659312800 \sin(x e^x) \left(2 e^x + x e^x\right)^2 \left(3 e^x + x e^x\right)^2 \left(5 e^x + x e^x\right)^2 \\
&- 65181916800 \sin(x e^x) \left(e^x + x e^x\right) \left(3 e^x + x e^x\right)^3 \left(5 e^x + x e^x\right)^2 \\
&+ 14665931280 \cos(x e^x) \left(2 e^x + x e^x\right)^2 \left(5 e^x + x e^x\right)^2 \left(6 e^x + x e^x\right) \\
&+ 12221609400 \cos(x e^x) \left(2 e^x + x e^x\right)^2 \left(4 e^x + x e^x\right) \left(6 e^x + x e^x\right)^2 \\
&- 29331862560 \sin(x e^x) \left(e^x + x e^x\right)^2 \left(2 e^x + x e^x\right) \left(5 e^x + x e^x\right)^2 \left(6 e^x + x e^x\right) \\
&- 24443218800 \sin(x e^x) \left(e^x + x e^x\right)^2 \left(2 e^x + x e^x\right) \left(4 e^x + x e^x\right) \left(6 e^x + x e^x\right)^2 \\
&+ 274986211500 \cos(x e^x) \left(e^x + x e^x\right)^2 \left(2 e^x + x e^x\right)^5 \left(4 e^x + x e^x\right)^2 \\
&- 733296564000 \sin(x e^x) \left(e^x + x e^x\right)^3 \left(2 e^x + x e^x\right)^5 \left(3 e^x + x e^x\right) \left(4 e^x + x e^x\right) \\
&- 1222160940000 \sin(x e^x) \left(e^x + x e^x\right)^4 \left(2 e^x + x e^x\right)^3 \left(3 e^x + x e^x\right)^2 \left(4 e^x + x e^x\right)
\end{aligned}
$$

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\begin{aligned}
&+135795660000\cos(x\,e^x)\,(e^x+x\,e^x)^4\,(3\,e^x+x\,e^x)^4\,(4\,e^x+x\,e^x)\\
&+325909584000\cos(x\,e^x)\,(e^x+x\,e^x)^4\,(2\,e^x+x\,e^x)\,(3\,e^x+x\,e^x)^3\,(5\,e^x+x\,e^x)\\
&-325909584000\sin(x\,e^x)\,(e^x+x\,e^x)^5\,(2\,e^x+x\,e^x)\,(3\,e^x+x\,e^x)^3\,(4\,e^x+x\,e^x)\\
&+152770117500\cos(x\,e^x)\,(e^x+x\,e^x)^4\,(2\,e^x+x\,e^x)^2\,(4\,e^x+x\,e^x)^3\\
&-366648282000\sin(x\,e^x)\,(e^x+x\,e^x)^5\,(2\,e^x+x\,e^x)^2\,(3\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)^2\\
&+73329656400\cos(x\,e^x)\,(e^x+x\,e^x)^4\,(5\,e^x+x\,e^x)^2\,(2\,e^x+x\,e^x)^3\\
&-146659312800\sin(x\,e^x)\,(e^x+x\,e^x)^5\,(4\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)^3\,(5\,e^x+x\,e^x)\\
&+6547290750\cos(x\,e^x)\,(2\,e^x+x\,e^x)^2\,(4\,e^x+x\,e^x)^2\,(8\,e^x+x\,e^x)\\
&+5819814000\cos(x\,e^x)\,(2\,e^x+x\,e^x)^2\,(3\,e^x+x\,e^x)\,(9\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)\\
&+2909907000\cos(x\,e^x)\,(e^x+x\,e^x)\,(4\,e^x+x\,e^x)^2\,(9\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)\\
&+8729721000\cos(x\,e^x)\,(e^x+x\,e^x)\,(4\,e^x+x\,e^x)^2\,(8\,e^x+x\,e^x)\,(3\,e^x+x\,e^x)\\
&-13094581500\sin(x\,e^x)\,(e^x+x\,e^x)^2\,(4\,e^x+x\,e^x)^2\,(8\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)\\
&-17459442000\sin(x\,e^x)\,(e^x+x\,e^x)^2\,(3\,e^x+x\,e^x)^2\,(8\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)\\
&-34918884000\sin(x\,e^x)\,(e^x+x\,e^x)^2\,(4\,e^x+x\,e^x)^2\,(7\,e^x+x\,e^x)\,(3\,e^x+x\,e^x)\\
&+69837768000\cos(x\,e^x)\,(e^x+x\,e^x)^4\,(3\,e^x+x\,e^x)\,(7\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)^3\\
&-97772875200\sin(x\,e^x)\,(e^x+x\,e^x)^5\,(3\,e^x+x\,e^x)\,(6\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)^3\\
&+27935107200\cos(x\,e^x)\,(e^x+x\,e^x)^5\,(3\,e^x+x\,e^x)^2\,(7\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)\\
&+21727305600\cos(x\,e^x)\,(e^x+x\,e^x)^5\,(3\,e^x+x\,e^x)^3\,(6\,e^x+x\,e^x)\\
&-32590958400\sin(x\,e^x)\,(e^x+x\,e^x)^6\,(3\,e^x+x\,e^x)^2\,(6\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)\\
&-97772875200\cos(x\,e^x)\,(e^x+x\,e^x)^6\,(2\,e^x+x\,e^x)^3\,(5\,e^x+x\,e^x)\,(3\,e^x+x\,e^x)\\
&-61108047000\cos(x\,e^x)\,(e^x+x\,e^x)^6\,(2\,e^x+x\,e^x)^3\,(4\,e^x+x\,e^x)^2\\
&+69837768000\sin(x\,e^x)\,(e^x+x\,e^x)^7\,(2\,e^x+x\,e^x)^3\,(4\,e^x+x\,e^x)\,(3\,e^x+x\,e^x)\\
&-15519504000\cos(x\,e^x)\,(e^x+x\,e^x)^7\,(3\,e^x+x\,e^x)^3\,(4\,e^x+x\,e^x)\\
&-27935107200\cos(x\,e^x)\,(e^x+x\,e^x)^7\,(2\,e^x+x\,e^x)\,(5\,e^x+x\,e^x)\,(3\,e^x+x\,e^x)^2\\
&+17459442000\sin(x\,e^x)\,(e^x+x\,e^x)^8\,(2\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)\,(3\,e^x+x\,e^x)^2\\
&-40738698000\cos(x\,e^x)\,(e^x+x\,e^x)^3\,(4\,e^x+x\,e^x)^3\,(5\,e^x+x\,e^x)\\
&-81477396000\cos(x\,e^x)\,(e^x+x\,e^x)^3\,(3\,e^x+x\,e^x)\,(6\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)^2\\
&+122216094000\sin(x\,e^x)\,(e^x+x\,e^x)^4\,(3\,e^x+x\,e^x)\,(5\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)^2\\
&-19554575040\cos(x\,e^x)\,(e^x+x\,e^x)^3\,(2\,e^x+x\,e^x)\,(5\,e^x+x\,e^x)^3\\
&+73329656400\sin(x\,e^x)\,(e^x+x\,e^x)^4\,(2\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)\,(5\,e^x+x\,e^x)^2\\
&-407386980000\cos(x\,e^x)\,(2\,e^x+x\,e^x)^2\,(3\,e^x+x\,e^x)^4\,(4\,e^x+x\,e^x)
\end{aligned}
$$

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\begin{aligned}
&- 325909584000 \cos(x e^x) \left(e^x + x e^x\right) \left(2 e^x + x e^x\right) \left(3 e^x + x e^x\right)^4 \left(5 e^x + x e^x\right) \\
&+ 814773960000 \sin(x e^x) \left(e^x + x e^x\right)^2 \left(2 e^x + x e^x\right) \left(3 e^x + x e^x\right)^4 \left(4 e^x + x e^x\right) \\
&- 611080470000 \cos(x e^x) \left(2 e^x + x e^x\right)^3 \left(3 e^x + x e^x\right)^2 \left(4 e^x + x e^x\right)^2 \\
&+ 1833241410000 \sin(x e^x) \left(e^x + x e^x\right)^2 \left(2 e^x + x e^x\right)^2 \left(3 e^x + x e^x\right)^2 \left(4 e^x + x e^x\right)^2 \\
&- 203693490000 \cos(x e^x) \left(e^x + x e^x\right)^2 \left(3 e^x + x e^x\right)^2 \left(4 e^x + x e^x\right)^3 \\
&- 76385058750 \cos(x e^x) \left(e^x + x e^x\right)^2 \left(2 e^x + x e^x\right) \left(4 e^x + x e^x\right)^4 \\
&+ 407386980000 \sin(x e^x) \left(e^x + x e^x\right)^3 \left(2 e^x + x e^x\right) \left(3 e^x + x e^x\right) \left(4 e^x + x e^x\right)^3 \\
&- 244432188000 \sin(x e^x) \left(2 e^x + x e^x\right)^2 \left(3 e^x + x e^x\right)^2 \left(6 e^x + x e^x\right) \left(4 e^x + x e^x\right) \\
&- 108636528000 \sin(x e^x) \left(e^x + x e^x\right) \left(3 e^x + x e^x\right)^3 \left(6 e^x + x e^x\right) \left(4 e^x + x e^x\right) \\
&+ 997682400 \cos(x e^x) \left(e^x + x e^x\right)^2 \left(7 e^x + x e^x\right) \left(3 e^x + x e^x\right) \left(8 e^x + x e^x\right) \\
&- 2993047200 \sin(x e^x) \left(e^x + x e^x\right)^2 \left(7 e^x + x e^x\right)^2 \left(2 e^x + x e^x\right)^2 \\
&- 997682400 \sin(x e^x) \left(e^x + x e^x\right)^3 \left(7 e^x + x e^x\right) \left(2 e^x + x e^x\right) \left(8 e^x + x e^x\right) \\
&- 997682400 \cos(x e^x) \left(e^x + x e^x\right)^4 \left(7 e^x + x e^x\right)^2 \left(2 e^x + x e^x\right) \\
&+ 8139600 \sin(x e^x) \left(e^x + x e^x\right)^{13} \left(3 e^x + x e^x\right) \left(2 e^x + x e^x\right)^2 \\
&+ 155040 \cos(x e^x) \left(e^x + x e^x\right)^{15} \left(3 e^x + x e^x\right) \left(2 e^x + x e^x\right) \\
&+ 166280400 \sin(x e^x) \left(e^x + x e^x\right)^9 \left(7 e^x + x e^x\right) \left(2 e^x + x e^x\right)^2 \\
&+ 6046560 \cos(x e^x) \left(e^x + x e^x\right)^{11} \left(7 e^x + x e^x\right) \left(2 e^x + x e^x\right) \\
&+ 698377680 \sin(x e^x) \left(e^x + x e^x\right) \left(5 e^x + x e^x\right) \left(8 e^x + x e^x\right) \left(6 e^x + x e^x\right) \\
&+ 1047566520 \cos(x e^x) \left(e^x + x e^x\right)^2 \left(5 e^x + x e^x\right)^2 \left(8 e^x + x e^x\right) \\
&+ 83140200 \sin(x e^x) \left(e^x + x e^x\right) \left(2 e^x + x e^x\right) \left(8 e^x + x e^x\right) \left(9 e^x + x e^x\right) \\
&+ 187065450 \cos(x e^x) \left(e^x + x e^x\right)^2 \left(2 e^x + x e^x\right) \left(8 e^x + x e^x\right)^2 \\
&+ 27713400 \cos(x e^x) \left(e^x + x e^x\right)^3 \left(8 e^x + x e^x\right) \left(9 e^x + x e^x\right) \\
&- 26453700 \cos(x e^x) \left(e^x + x e^x\right)^{12} \left(4 e^x + x e^x\right) \left(2 e^x + x e^x\right)^2 \\
&- 63488880 \sin(x e^x) \left(e^x + x e^x\right)^{11} \left(5 e^x + x e^x\right) \left(2 e^x + x e^x\right)^2 \\
&+ 2325600 \sin(x e^x) \left(e^x + x e^x\right) \left(2 e^x + x e^x\right) \left(14 e^x + x e^x\right) \left(3 e^x + x e^x\right) \\
&+ 1744200 \cos(x e^x) \left(e^x + x e^x\right)^2 \left(2 e^x + x e^x\right)^2 \left(14 e^x + x e^x\right) \\
&- 8139600 \sin(x e^x) \left(e^x + x e^x\right)^3 \left(13 e^x + x e^x\right) \left(2 e^x + x e^x\right)^2 \\
&- 1627920 \cos(x e^x) \left(e^x + x e^x\right)^5 \left(13 e^x + x e^x\right) \left(2 e^x + x e^x\right) \\
&- 325909584000 \cos(x e^x) \left(2 e^x + x e^x\right)^3 \left(3 e^x + x e^x\right)^3 \left(5 e^x + x e^x\right) \\
&+ 271591320000 \sin(x e^x) \left(e^x + x e^x\right)^3 \left(3 e^x + x e^x\right)^3 \left(4 e^x + x e^x\right)^2 \\
&+ 305540235000 \sin(x e^x) \left(e^x + x e^x\right)^2 \left(2 e^x + x e^x\right)^3 \left(4 e^x + x e^x\right)^3
\end{aligned}
$$

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\begin{aligned}
&+ 40738698000 \cos(x e^x) \left(3 e^x + x e^x\right)^2 \left(6 e^x + x e^x\right) \left(4 e^x + x e^x\right)^2 \\
&- 36664828200 \sin(x e^x) \left(e^x + x e^x\right)^2 \left(4 e^x + x e^x\right)^2 \left(5 e^x + x e^x\right)^2 \\
&+ 2793510720 \cos(x e^x) \left(e^x + x e^x\right)^6 \left(5 e^x + x e^x\right) \left(7 e^x + x e^x\right) \left(2 e^x + x e^x\right) \\
&+ 1745944200 \cos(x e^x) \left(e^x + x e^x\right)^6 \left(4 e^x + x e^x\right) \left(8 e^x + x e^x\right) \left(2 e^x + x e^x\right) \\
&- 1995364800 \sin(x e^x) \left(e^x + x e^x\right)^7 \left(4 e^x + x e^x\right) \left(7 e^x + x e^x\right) \left(2 e^x + x e^x\right) \\
&- 55426800 \cos(x e^x) \left(e^x + x e^x\right)^9 \left(4 e^x + x e^x\right) \left(7 e^x + x e^x\right) \\
&+ 775975200 \cos(x e^x) \left(e^x + x e^x\right)^6 \left(3 e^x + x e^x\right) \left(9 e^x + x e^x\right) \left(2 e^x + x e^x\right) \\
&- 997682400 \sin(x e^x) \left(e^x + x e^x\right)^7 \left(3 e^x + x e^x\right) \left(8 e^x + x e^x\right) \left(2 e^x + x e^x\right) \\
&- 27713400 \cos(x e^x) \left(e^x + x e^x\right)^9 \left(3 e^x + x e^x\right) \left(8 e^x + x e^x\right) \\
&+ 775975200 \sin(x e^x) \left(e^x + x e^x\right)^9 \left(6 e^x + x e^x\right) \left(3 e^x + x e^x\right) \left(2 e^x + x e^x\right) \\
&+ 14108640 \cos(x e^x) \left(e^x + x e^x\right)^{11} \left(6 e^x + x e^x\right) \left(3 e^x + x e^x\right) \\
&+ 2793510720 \sin(x e^x) \left(2 e^x + x e^x\right) \left(5 e^x + x e^x\right) \left(7 e^x + x e^x\right) \left(6 e^x + x e^x\right) \\
&+ 66512160 \sin(x e^x) \left(e^x + x e^x\right) \left(2 e^x + x e^x\right) \left(7 e^x + x e^x\right) \left(10 e^x + x e^x\right) \\
&+ 22170720 \cos(x e^x) \left(e^x + x e^x\right)^3 \left(7 e^x + x e^x\right) \left(10 e^x + x e^x\right) \\
&+ 21162960 \sin(x e^x) \left(e^x + x e^x\right) \left(2 e^x + x e^x\right) \left(5 e^x + x e^x\right) \left(12 e^x + x e^x\right) \\
&+ 7054320 \cos(x e^x) \left(e^x + x e^x\right)^3 \left(5 e^x + x e^x\right) \left(12 e^x + x e^x\right) + 8139600 \sin(x e^x) \left(e^x \right. \\
&\left. + x e^x\right) \left(2 e^x + x e^x\right) \left(4 e^x + x e^x\right) \left(13 e^x + x e^x\right) + 2713200 \cos(x e^x) \left(e^x \right. \\
&\left. + x e^x\right)^3 \left(4 e^x + x e^x\right) \left(13 e^x + x e^x\right) - 211629600 \sin(x e^x) \left(e^x + x e^x\right)^{11} \left(4 e^x \right. \\
&\left. + x e^x\right) \left(3 e^x + x e^x\right) \left(2 e^x + x e^x\right) + 42325920 \sin(x e^x) \left(e^x + x e^x\right) \left(2 e^x + x e^x\right) \left(6 e^x \right. \\
&\left. + x e^x\right) \left(11 e^x + x e^x\right) + 14108640 \cos(x e^x) \left(e^x + x e^x\right)^3 \left(6 e^x + x e^x\right) \left(11 e^x + x e^x\right) \\
&+ 16279200 \cos(x e^x) \left(e^x + x e^x\right)^2 \left(13 e^x + x e^x\right) \left(3 e^x + x e^x\right) \left(2 e^x + x e^x\right) \\
&- 70543200 \sin(x e^x) \left(e^x + x e^x\right)^3 \left(12 e^x + x e^x\right) \left(3 e^x + x e^x\right) \left(2 e^x + x e^x\right) \\
&- 7054320 \cos(x e^x) \left(e^x + x e^x\right)^5 \left(12 e^x + x e^x\right) \left(3 e^x + x e^x\right) \\
&+ 63488880 \sin(x e^x) \left(e^x + x e^x\right)^5 \left(11 e^x + x e^x\right) \left(2 e^x + x e^x\right)^2 \\
&+ 465585120 \sin(x e^x) \left(e^x + x e^x\right)^5 \left(10 e^x + x e^x\right) \left(3 e^x + x e^x\right) \left(2 e^x + x e^x\right) \\
&- 187065450 \cos(x e^x) \left(e^x + x e^x\right)^8 \left(8 e^x + x e^x\right) \left(2 e^x + x e^x\right)^2 \\
&- 166280400 \sin(x e^x) \left(e^x + x e^x\right)^7 \left(9 e^x + x e^x\right) \left(2 e^x + x e^x\right)^2 \\
&- 104756652000 \cos(x e^x) \left(e^x + x e^x\right)^3 \left(2 e^x + x e^x\right)^7 \left(3 e^x + x e^x\right) \\
&+ 36664828200 \cos(x e^x) \left(e^x + x e^x\right)^2 \left(2 e^x + x e^x\right)^6 \left(6 e^x + x e^x\right) \\
&+ 1163962800 \cos(x e^x) \left(2 e^x + x e^x\right)^2 \left(10 e^x + x e^x\right) \left(3 e^x + x e^x\right)^2 \\
&- 2327925600 \sin(x e^x) \left(e^x + x e^x\right) \left(2 e^x + x e^x\right)^3 \left(10 e^x + x e^x\right) \left(3 e^x + x e^x\right)
\end{aligned}
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\begin{aligned}
&-5819814000\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{3}\left(9\,e^{x}+x\,e^{x}\right)\left(4\,e^{x}+x\,e^{x}\right)\\
&-872972100\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{2}\left(2\,e^{x}+x\,e^{x}\right)^{4}\left(10\,e^{x}+x\,e^{x}\right)\\
&-17459442000\sin\left(x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{3}\left(8\,e^{x}+x\,e^{x}\right)\left(3\,e^{x}+x\,e^{x}\right)^{2}\\
&-26189163000\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{4}\left(8\,e^{x}+x\,e^{x}\right)\left(3\,e^{x}+x\,e^{x}\right)\\
&-52378326000\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{4}\left(7\,e^{x}+x\,e^{x}\right)\left(4\,e^{x}+x\,e^{x}\right)\\
&+104756652000\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{2}\left(2\,e^{x}+x\,e^{x}\right)^{4}\left(7\,e^{x}+x\,e^{x}\right)\left(3\,e^{x}+x\,e^{x}\right)\\
&+20951330400\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{3}\left(2\,e^{x}+x\,e^{x}\right)^{5}\left(7\,e^{x}+x\,e^{x}\right)\\
&+232792560\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)\left(4\,e^{x}+x\,e^{x}\right)\left(10\,e^{x}+x\,e^{x}\right)\left(5\,e^{x}+x\,e^{x}\right)\\
&+387987600\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)\left(4\,e^{x}+x\,e^{x}\right)\left(9\,e^{x}+x\,e^{x}\right)\left(6\,e^{x}+x\,e^{x}\right)\\
&+1163962800\sin\left(x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)\left(4\,e^{x}+x\,e^{x}\right)\left(9\,e^{x}+x\,e^{x}\right)\left(5\,e^{x}+x\,e^{x}\right)\\
&-13967553600\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{7}\left(3\,e^{x}+x\,e^{x}\right)\left(6\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{2}\\
&-293318625600\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{5}\left(2\,e^{x}+x\,e^{x}\right)^{2}\left(5\,e^{x}+x\,e^{x}\right)\left(3\,e^{x}+x\,e^{x}\right)^{2}\\
&+5819814000\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{9}\left(2\,e^{x}+x\,e^{x}\right)^{2}\left(4\,e^{x}+x\,e^{x}\right)\left(3\,e^{x}+x\,e^{x}\right)\\
&-325909584000\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{2}\left(3\,e^{x}+x\,e^{x}\right)^{3}\left(6\,e^{x}+x\,e^{x}\right)\\
&+122216094000\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{4}\left(4\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{3}\left(6\,e^{x}+x\,e^{x}\right)\\
&+97772875200\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{5}\left(4\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)\left(6\,e^{x}+x\,e^{x}\right)\left(3\,e^{x}\right.\\
&\left.+x\,e^{x}\right)+733296564000\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{4}\left(3\,e^{x}+x\,e^{x}\right)^{2}\left(5\,e^{x}\right.\\
&\left.+x\,e^{x}\right)+439977938400\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{2}\left(2\,e^{x}+x\,e^{x}\right)^{5}\left(3\,e^{x}+x\,e^{x}\right)\left(5\,e^{x}\right.\\
&\left.+x\,e^{x}\right)+977728752000\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{2}\left(2\,e^{x}+x\,e^{x}\right)^{2}\left(3\,e^{x}+x\,e^{x}\right)^{3}\left(5\,e^{x}\right.\\
&\left.+x\,e^{x}\right)+977728752000\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{3}\left(2\,e^{x}+x\,e^{x}\right)^{3}\left(3\,e^{x}+x\,e^{x}\right)^{2}\left(5\,e^{x}\right.\\
&\left.+x\,e^{x}\right)+27935107200\cos\left(x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)\left(3\,e^{x}+x\,e^{x}\right)^{2}\left(7\,e^{x}+x\,e^{x}\right)\left(5\,e^{x}\right.\\
&\left.+x\,e^{x}\right)+8380532160\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)\left(5\,e^{x}+x\,e^{x}\right)^{2}\left(7\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)\\
&+10475665200\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)\left(4\,e^{x}+x\,e^{x}\right)\left(8\,e^{x}+x\,e^{x}\right)\left(5\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}\right.\\
&\left.+x\,e^{x}\right)+13967553600\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)\left(4\,e^{x}+x\,e^{x}\right)\left(7\,e^{x}+x\,e^{x}\right)\left(6\,e^{x}\right.\\
&\left.+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)+27935107200\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)\left(4\,e^{x}+x\,e^{x}\right)\left(7\,e^{x}\right.\\
&\left.+x\,e^{x}\right)\left(5\,e^{x}+x\,e^{x}\right)\left(3\,e^{x}+x\,e^{x}\right)-41902660800\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{2}\left(4\,e^{x}\right.\\
&\left.+x\,e^{x}\right)\left(7\,e^{x}+x\,e^{x}\right)\left(5\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)+4655851200\cos\left(x\,e^{x}\right)\left(e^{x}\right.\\
&\left.+x\,e^{x}\right)\left(3\,e^{x}+x\,e^{x}\right)\left(9\,e^{x}+x\,e^{x}\right)\left(5\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)\\
&+6983776800\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)\left(3\,e^{x}+x\,e^{x}\right)\left(8\,e^{x}+x\,e^{x}\right)\left(6\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}\right.\\
&\left.+x\,e^{x}\right)+6983776800\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)\left(3\,e^{x}+x\,e^{x}\right)^{2}\left(8\,e^{x}+x\,e^{x}\right)\left(5\,e^{x}+x\,e^{x}\right)\\
&-20951330400\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{2}\left(3\,e^{x}+x\,e^{x}\right)\left(8\,e^{x}+x\,e^{x}\right)\left(5\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}\right.\\
&\left.+x\,e^{x}\right)+3990729600\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)\left(3\,e^{x}+x\,e^{x}\right)\left(7\,e^{x}+x\,e^{x}\right)^{2}\left(2\,e^{x}+x\,e^{x}\right)
\end{aligned}
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\begin{aligned}
&-27935107200\sin(x\,e^x)\,(e^x+x\,e^x)^2\,(3\,e^x+x\,e^x)\,(7\,e^x+x\,e^x)\,(6\,e^x+x\,e^x)\,(2\,e^x\\
&+x\,e^x)-34918884000\cos(x\,e^x)\,(e^x+x\,e^x)^3\,(4\,e^x+x\,e^x)^2\,(7\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)\\
&-34918884000\cos(x\,e^x)\,(e^x+x\,e^x)^3\,(3\,e^x+x\,e^x)\,(8\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)\,(2\,e^x\\
&+x\,e^x)-46558512000\cos(x\,e^x)\,(e^x+x\,e^x)^3\,(3\,e^x+x\,e^x)^2\,(7\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)\\
&+69837768000\sin(x\,e^x)\,(e^x+x\,e^x)^4\,(3\,e^x+x\,e^x)\,(7\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)\,(2\,e^x\\
&+x\,e^x)-97772875200\cos(x\,e^x)\,(e^x+x\,e^x)^3\,(4\,e^x+x\,e^x)\,(6\,e^x+x\,e^x)\,(5\,e^x\\
&+x\,e^x)\,(2\,e^x+x\,e^x)-32590958400\cos(x\,e^x)\,(e^x+x\,e^x)^3\,(3\,e^x+x\,e^x)\,(6\,e^x\\
&+x\,e^x)^2\,(2\,e^x+x\,e^x)-65181916800\cos(x\,e^x)\,(e^x+x\,e^x)^3\,(3\,e^x+x\,e^x)^2\,(6\,e^x\\
&+x\,e^x)\,(5\,e^x+x\,e^x)+58663725120\cos(x\,e^x)\,(e^x+x\,e^x)^5\,(5\,e^x+x\,e^x)^2\,(3\,e^x\\
&+x\,e^x)\,(2\,e^x+x\,e^x)+73329656400\cos(x\,e^x)\,(e^x+x\,e^x)^5\,(4\,e^x+x\,e^x)^2\,(5\,e^x\\
&+x\,e^x)\,(2\,e^x+x\,e^x)+97772875200\cos(x\,e^x)\,(e^x+x\,e^x)^5\,(4\,e^x+x\,e^x)\,(3\,e^x\\
&+x\,e^x)^2\,(5\,e^x+x\,e^x)-97772875200\sin(x\,e^x)\,(e^x+x\,e^x)^6\,(4\,e^x+x\,e^x)\,(3\,e^x\\
&+x\,e^x)\,(5\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)-293318625600\sin(x\,e^x)\,(e^x+x\,e^x)\,(2\,e^x\\
&+x\,e^x)\,(3\,e^x+x\,e^x)\,(5\,e^x+x\,e^x)^2\,(4\,e^x+x\,e^x)-195545750400\sin(x\,e^x)\,(e^x\\
&+x\,e^x)\,(2\,e^x+x\,e^x)\,(3\,e^x+x\,e^x)^2\,(5\,e^x+x\,e^x)\,(6\,e^x+x\,e^x)\\
&-97772875200\sin(x\,e^x)\,(2\,e^x+x\,e^x)^3\,(3\,e^x+x\,e^x)\,(5\,e^x+x\,e^x)\,(6\,e^x+x\,e^x)\\
&-146659312800\sin(x\,e^x)\,(e^x+x\,e^x)\,(2\,e^x+x\,e^x)^2\,(4\,e^x+x\,e^x)\,(5\,e^x+x\,e^x)\,(6\,e^x\\
&+x\,e^x)-48886437600\sin(x\,e^x)\,(e^x+x\,e^x)\,(2\,e^x+x\,e^x)^2\,(3\,e^x+x\,e^x)\,(6\,e^x+x\,e^x)^2\\
&+97772875200\cos(x\,e^x)\,(2\,e^x+x\,e^x)\,(3\,e^x+x\,e^x)\,(5\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)\,(6\,e^x\\
&+x\,e^x)+24443218800\cos(x\,e^x)\,(e^x+x\,e^x)\,(4\,e^x+x\,e^x)^2\,(5\,e^x+x\,e^x)\,(6\,e^x+x\,e^x)\\
&+19554575040\cos(x\,e^x)\,(e^x+x\,e^x)\,(3\,e^x+x\,e^x)\,(5\,e^x+x\,e^x)^2\,(6\,e^x+x\,e^x)\\
&-97772875200\sin(x\,e^x)\,(e^x+x\,e^x)^2\,(3\,e^x+x\,e^x)\,(5\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)\,(6\,e^x\\
&+x\,e^x)+9777287520\cos(x\,e^x)\,(e^x+x\,e^x)\,(2\,e^x+x\,e^x)\,(5\,e^x+x\,e^x)\,(6\,e^x+x\,e^x)^2\\
&+366648282000\cos(x\,e^x)\,(e^x+x\,e^x)\,(2\,e^x+x\,e^x)^6\,(3\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)\\
&+1833241410000\cos(x\,e^x)\,(e^x+x\,e^x)^2\,(2\,e^x+x\,e^x)^4\,(3\,e^x+x\,e^x)^2\,(4\,e^x+x\,e^x)\\
&+1629547920000\cos(x\,e^x)\,(e^x+x\,e^x)^3\,(2\,e^x+x\,e^x)^2\,(3\,e^x+x\,e^x)^3\,(4\,e^x+x\,e^x)\\
&+1222160940000\cos(x\,e^x)\,(e^x+x\,e^x)^3\,(2\,e^x+x\,e^x)^3\,(3\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)^2\\
&+611080470000\cos(x\,e^x)\,(e^x+x\,e^x)^4\,(2\,e^x+x\,e^x)\,(3\,e^x+x\,e^x)^2\,(4\,e^x+x\,e^x)^2\\
&+17459442000\cos(x\,e^x)\,(2\,e^x+x\,e^x)\,(3\,e^x+x\,e^x)^2\,(8\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)\\
&+2327925600\cos(x\,e^x)\,(e^x+x\,e^x)\,(3\,e^x+x\,e^x)\,(10\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)\,(4\,e^x\\
&+x\,e^x)+3879876000\cos(x\,e^x)\,(e^x+x\,e^x)\,(3\,e^x+x\,e^x)^2\,(9\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)
\end{aligned}
$$

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\begin{aligned}
&-11639628000\sin(x\,e^x)\,(e^x+x\,e^x)^2\,(3\,e^x+x\,e^x)\,(9\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)\,(4\,e^x\\
&+x\,e^x)+244432188000\cos(x\,e^x)\,(e^x+x\,e^x)^4\,(3\,e^x+x\,e^x)^2\,(6\,e^x+x\,e^x)\,(2\,e^x\\
&+x\,e^x)^2+61108047000\sin(x\,e^x)\,(e^x+x\,e^x)^4\,(4\,e^x+x\,e^x)^2\,(6\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)\\
&+81477396000\sin(x\,e^x)\,(e^x+x\,e^x)^4\,(3\,e^x+x\,e^x)^2\,(6\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)\\
&-366648282000\cos(x\,e^x)\,(e^x+x\,e^x)^5\,(2\,e^x+x\,e^x)^4\,(4\,e^x+x\,e^x)\,(3\,e^x+x\,e^x)\\
&-244432188000\cos(x\,e^x)\,(e^x+x\,e^x)^6\,(2\,e^x+x\,e^x)^2\,(4\,e^x+x\,e^x)\,(3\,e^x+x\,e^x)^2\\
&-34918884000\cos(x\,e^x)\,(e^x+x\,e^x)^7\,(2\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)^2\,(3\,e^x+x\,e^x)\\
&-97772875200\cos(x\,e^x)\,(e^x+x\,e^x)^3\,(3\,e^x+x\,e^x)\,(5\,e^x+x\,e^x)^2\,(4\,e^x+x\,e^x)\\
&-814773960000\cos(x\,e^x)\,(e^x+x\,e^x)\,(2\,e^x+x\,e^x)\,(3\,e^x+x\,e^x)^3\,(4\,e^x+x\,e^x)^2\\
&-611080470000\cos(x\,e^x)\,(e^x+x\,e^x)\,(2\,e^x+x\,e^x)^2\,(3\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)^3\\
&-366648282000\sin(x\,e^x)\,(2\,e^x+x\,e^x)^2\,(3\,e^x+x\,e^x)\,(5\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)^2\\
&-244432188000\sin(x\,e^x)\,(e^x+x\,e^x)\,(3\,e^x+x\,e^x)^2\,(5\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)^2\\
&-122216094000\sin(x\,e^x)\,(e^x+x\,e^x)\,(2\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)^3\,(5\,e^x+x\,e^x)\\
&-244432188000\sin(x\,e^x)\,(e^x+x\,e^x)\,(2\,e^x+x\,e^x)\,(3\,e^x+x\,e^x)\,(6\,e^x\\
&+x\,e^x)\,(4\,e^x+x\,e^x)^2-325909584000\sin(x\,e^x)\,(2\,e^x+x\,e^x)\,(3\,e^x+x\,e^x)^3\,(5\,e^x\\
&+x\,e^x)\,(4\,e^x+x\,e^x)+38798760\sin(x\,e^x)\,(e^x+x\,e^x)^6\,(10\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)\\
&+203693490000\sin(x\,e^x)\,(2\,e^x+x\,e^x)^4\,(3\,e^x+x\,e^x)^4\\
&+366648282000\sin(x\,e^x)\,(2\,e^x+x\,e^x)^5\,(3\,e^x+x\,e^x)^2\,(4\,e^x+x\,e^x)\\
&+488864376000\cos(x\,e^x)\,(e^x+x\,e^x)\,(2\,e^x+x\,e^x)^5\,(3\,e^x+x\,e^x)^3\\
&+52378326000\cos(x\,e^x)\,(2\,e^x+x\,e^x)^7\,(3\,e^x+x\,e^x)^2\\
&-366648282000\sin(x\,e^x)\,(e^x+x\,e^x)^2\,(2\,e^x+x\,e^x)^6\,(3\,e^x+x\,e^x)^2\\
&+31426995600\cos(x\,e^x)\,(e^x+x\,e^x)\,(2\,e^x+x\,e^x)^7\,(5\,e^x+x\,e^x)\\
&-78567489000\sin(x\,e^x)\,(e^x+x\,e^x)^2\,(2\,e^x+x\,e^x)^7\,(4\,e^x+x\,e^x)\\
&+10475665200\sin(x\,e^x)\,(e^x+x\,e^x)\,(2\,e^x+x\,e^x)^6\,(7\,e^x+x\,e^x)\\
&+581981400\cos(x\,e^x)\,(2\,e^x+x\,e^x)^3\,(10\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)\\
&+1163962800\cos(x\,e^x)\,(2\,e^x+x\,e^x)^3\,(9\,e^x+x\,e^x)\,(5\,e^x+x\,e^x)\\
&-2909907000\sin(x\,e^x)\,(2\,e^x+x\,e^x)^4\,(9\,e^x+x\,e^x)\,(3\,e^x+x\,e^x)\\
&-1745944200\cos(x\,e^x)\,(e^x+x\,e^x)\,(2\,e^x+x\,e^x)^5\,(9\,e^x+x\,e^x)\\
&-6547290750\sin(x\,e^x)\,(2\,e^x+x\,e^x)^4\,(8\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)\\
&-10475665200\sin(x\,e^x)\,(2\,e^x+x\,e^x)^4\,(7\,e^x+x\,e^x)\,(5\,e^x+x\,e^x)\\
&-20951330400\cos(x\,e^x)\,(2\,e^x+x\,e^x)^5\,(7\,e^x+x\,e^x)\,(3\,e^x+x\,e^x)
\end{aligned}
$$

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\begin{aligned}
&+ 7856748900 \sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{2}\left(2\,e^{x}+x\,e^{x}\right)^{5}\left(8\,e^{x}+x\,e^{x}\right)\\
&- 38798760 \cos\left(x\,e^{x}\right)\left(4\,e^{x}+x\,e^{x}\right)\left(10\,e^{x}+x\,e^{x}\right)\left(6\,e^{x}+x\,e^{x}\right)\\
&- 55426800 \cos\left(x\,e^{x}\right)\left(4\,e^{x}+x\,e^{x}\right)\left(9\,e^{x}+x\,e^{x}\right)\left(7\,e^{x}+x\,e^{x}\right)\\
&+ 969969000 \sin\left(x\,e^{x}\right)\left(3\,e^{x}+x\,e^{x}\right)\left(4\,e^{x}+x\,e^{x}\right)^{2}\left(9\,e^{x}+x\,e^{x}\right)\\
&+ 290990700 \sin\left(x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)\left(4\,e^{x}+x\,e^{x}\right)^{2}\left(10\,e^{x}+x\,e^{x}\right)\\
&+ 4888643760 \sin\left(x\,e^{x}\right)\left(4\,e^{x}+x\,e^{x}\right)\left(5\,e^{x}+x\,e^{x}\right)^{2}\left(6\,e^{x}+x\,e^{x}\right)\\
&+ 9777287520 \cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)\left(4\,e^{x}+x\,e^{x}\right)\left(5\,e^{x}+x\,e^{x}\right)^{3}\\
&+ 775975200 \sin\left(x\,e^{x}\right)\left(3\,e^{x}+x\,e^{x}\right)^{2}\left(9\,e^{x}+x\,e^{x}\right)\left(5\,e^{x}+x\,e^{x}\right)\\
&+ 2586584000 \cos\left(x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)\left(3\,e^{x}+x\,e^{x}\right)^{3}\left(9\,e^{x}+x\,e^{x}\right)\\
&- 2586584000 \sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{2}\left(3\,e^{x}+x\,e^{x}\right)^{3}\left(9\,e^{x}+x\,e^{x}\right)\\
&- 73329656400 \sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{3}\left(2\,e^{x}+x\,e^{x}\right)^{6}\left(5\,e^{x}+x\,e^{x}\right)\\
&- 38192529375 \sin\left(x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{2}\left(4\,e^{x}+x\,e^{x}\right)^{4}\\
&- 6110804700 \sin\left(x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{4}\left(6\,e^{x}+x\,e^{x}\right)^{2} - 3259095840 \sin\left(x\,e^{x}\right)\left(e^{x}\right.\\
&\left.+x\,e^{x}\right)^{3}\left(5\,e^{x}+x\,e^{x}\right)\left(6\,e^{x}+x\,e^{x}\right)^{2} + 997682400 \cos\left(x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{3}\left(7\,e^{x}\right.\\
&\left.+x\,e^{x}\right)^{2} + 1745944200 \cos\left(x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{3}\left(6\,e^{x}+x\,e^{x}\right)\left(8\,e^{x}+x\,e^{x}\right)\\
&+ 3491888400 \sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{5}\left(4\,e^{x}+x\,e^{x}\right)^{2}\left(7\,e^{x}+x\,e^{x}\right)\\
&+ 775975200 \sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{5}\left(3\,e^{x}+x\,e^{x}\right)^{2}\left(9\,e^{x}+x\,e^{x}\right)\\
&- 46558512000 \sin\left(x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{2}\left(3\,e^{x}+x\,e^{x}\right)^{3}\left(7\,e^{x}+x\,e^{x}\right)\\
&+ 325909584000 \sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{2}\left(3\,e^{x}+x\,e^{x}\right)^{5}\\
&+ 15519504000 \sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{4}\left(3\,e^{x}+x\,e^{x}\right)^{3}\left(7\,e^{x}+x\,e^{x}\right)\\
&- 21727305600 \sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{6}\left(3\,e^{x}+x\,e^{x}\right)^{3}\left(5\,e^{x}+x\,e^{x}\right)\\
&+ 6547290750 \sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{8}\left(2\,e^{x}+x\,e^{x}\right)^{2}\left(4\,e^{x}+x\,e^{x}\right)^{2}\\
&+ 48886437600 \sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{4}\left(3\,e^{x}+x\,e^{x}\right)^{2}\left(5\,e^{x}+x\,e^{x}\right)^{2}\\
&- 76385058750 \cos\left(x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{4}\left(4\,e^{x}+x\,e^{x}\right)^{3}\\
&- 61108047000 \sin\left(x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{3}\left(4\,e^{x}+x\,e^{x}\right)^{2}\left(6\,e^{x}+x\,e^{x}\right)\\
&- 1330243200 \sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{7}\left(3\,e^{x}+x\,e^{x}\right)^{2}\left(7\,e^{x}+x\,e^{x}\right)\\
&+ 45831035250 \sin\left(x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{6}\left(4\,e^{x}+x\,e^{x}\right)^{2}\\
&- 21998896920 \cos\left(x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{5}\left(5\,e^{x}+x\,e^{x}\right)^{2}\\
&- 36664828200 \cos\left(x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{5}\left(4\,e^{x}+x\,e^{x}\right)\left(6\,e^{x}+x\,e^{x}\right)\\
&+ 109994484600 \sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{2}\left(2\,e^{x}+x\,e^{x}\right)^{4}\left(5\,e^{x}+x\,e^{x}\right)^{2}\\
&- 2793510720 \sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{3}\left(5\,e^{x}+x\,e^{x}\right)^{2}\left(7\,e^{x}+x\,e^{x}\right)
\end{aligned}
$$

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\begin{aligned}
&+2909907000\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{3}\left(2\,e^{x}+x\,e^{x}\right)^{4}\left(9\,e^{x}+x\,e^{x}\right)\\
&-969969000\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{3}\left(4\,e^{x}+x\,e^{x}\right)^{2}\left(9\,e^{x}+x\,e^{x}\right)\\
&-2182430250\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{4}\left(4\,e^{x}+x\,e^{x}\right)^{2}\left(8\,e^{x}+x\,e^{x}\right)\\
&+3259095840\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{5}\left(3\,e^{x}+x\,e^{x}\right)\left(6\,e^{x}+x\,e^{x}\right)^{2}\\
&+4888643760\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{6}\left(5\,e^{x}+x\,e^{x}\right)^{2}\left(4\,e^{x}+x\,e^{x}\right)\\
&-2793510720\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{7}\left(5\,e^{x}+x\,e^{x}\right)^{2}\left(3\,e^{x}+x\,e^{x}\right)\\
&-14665931280\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{6}\left(5\,e^{x}+x\,e^{x}\right)^{2}\left(2\,e^{x}+x\,e^{x}\right)^{2}\\
&+1955457504\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{5}\left(5\,e^{x}+x\,e^{x}\right)^{3}+969969000\sin\left(x\,e^{x}\right)\left(e^{x}\right.\\
&\left.+x\,e^{x}\right)^{9}\left(3\,e^{x}+x\,e^{x}\right)\left(4\,e^{x}+x\,e^{x}\right)^{2}-407386980000\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{4}\left(2\,e^{x}\right.\\
&\left.+x\,e^{x}\right)^{2}\left(3\,e^{x}+x\,e^{x}\right)^{4}+543182640\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{2}\left(6\,e^{x}+x\,e^{x}\right)^{3}\\
&+77597520\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{6}\left(9\,e^{x}+x\,e^{x}\right)\left(5\,e^{x}+x\,e^{x}\right)\\
&+543182640\sin\left(x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)\left(6\,e^{x}+x\,e^{x}\right)^{3}-21727305600\sin\left(x\,e^{x}\right)\left(e^{x}\right.\\
&\left.+x\,e^{x}\right)^{5}\left(3\,e^{x}+x\,e^{x}\right)^{5}-211629600\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{11}\left(3\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{3}\\
&-581981400\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{10}\left(4\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{3}\\
&-52907400\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{2}\left(12\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{3}\\
&-26453700\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{4}\left(12\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{2}\\
&+581981400\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{4}\left(10\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{3}\\
&+116396280\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{6}\left(10\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{2}\\
&-1995364800\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{7}\left(7\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{3}\\
&-1745944200\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{6}\left(8\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{3}\\
&-11639628000\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{2}\left(9\,e^{x}+x\,e^{x}\right)\left(3\,e^{x}+x\,e^{x}\right)^{2}\\
&-814773960000\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{3}\left(2\,e^{x}+x\,e^{x}\right)^{4}\left(3\,e^{x}+x\,e^{x}\right)^{3}\\
&-366648282000\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{4}\left(2\,e^{x}+x\,e^{x}\right)^{5}\left(3\,e^{x}+x\,e^{x}\right)^{2}\\
&-52378326000\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{2}\left(2\,e^{x}+x\,e^{x}\right)^{2}\left(3\,e^{x}+x\,e^{x}\right)^{2}\left(8\,e^{x}+x\,e^{x}\right)\\
&+139675536000\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{3}\left(2\,e^{x}+x\,e^{x}\right)^{2}\left(3\,e^{x}+x\,e^{x}\right)^{2}\left(7\,e^{x}+x\,e^{x}\right)\\
&+1496523600\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)\left(7\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{2}\left(8\,e^{x}+x\,e^{x}\right)\\
&+332560800\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{2}\left(7\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)\left(9\,e^{x}+x\,e^{x}\right)\\
&+1629547920\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{6}\left(6\,e^{x}+x\,e^{x}\right)^{2}\left(2\,e^{x}+x\,e^{x}\right)\\
&+6518191680\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{6}\left(5\,e^{x}+x\,e^{x}\right)\left(3\,e^{x}+x\,e^{x}\right)\left(6\,e^{x}+x\,e^{x}\right)\\
&-2793510720\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{7}\left(5\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)\left(6\,e^{x}+x\,e^{x}\right)\\
&-4655851200\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{7}\left(4\,e^{x}+x\,e^{x}\right)\left(3\,e^{x}+x\,e^{x}\right)\left(6\,e^{x}+x\,e^{x}\right)
\end{aligned}
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\begin{aligned}
&+183324141000\sin(x\,e^x)\,(e^x+x\,e^x)^2\,(2\,e^x+x\,e^x)^4\,(4\,e^x+x\,e^x)\,(6\,e^x+x\,e^x)\\
&+3491888400\sin(x\,e^x)\,(3\,e^x+x\,e^x)\,(8\,e^x+x\,e^x)\,(5\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)\\
&-23279256000\sin(x\,e^x)\,(e^x+x\,e^x)\,(2\,e^x+x\,e^x)\,(3\,e^x+x\,e^x)^3\,(8\,e^x+x\,e^x)\\
&-7759752000\cos(x\,e^x)\,(e^x+x\,e^x)^3\,(3\,e^x+x\,e^x)^3\,(8\,e^x+x\,e^x)\\
&-91662070500\cos(x\,e^x)\,(e^x+x\,e^x)^4\,(2\,e^x+x\,e^x)^6\,(4\,e^x+x\,e^x)\\
&+34918884000\cos(x\,e^x)\,(2\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)^2\,(7\,e^x+x\,e^x)\,(3\,e^x+x\,e^x)\\
&-203693490000\sin(x\,e^x)\,(2\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)^3\,(3\,e^x+x\,e^x)^2\\
&+40738698000\cos(x\,e^x)\,(e^x+x\,e^x)^5\,(4\,e^x+x\,e^x)^3\,(3\,e^x+x\,e^x)\\
&-73329656400\cos(x\,e^x)\,(e^x+x\,e^x)\,(2\,e^x+x\,e^x)^4\,(5\,e^x+x\,e^x)\,(6\,e^x+x\,e^x)\\
&-4655851200\sin(x\,e^x)\,(e^x+x\,e^x)^3\,(4\,e^x+x\,e^x)\,(6\,e^x+x\,e^x)\,(7\,e^x+x\,e^x)\\
&-4073869800\cos(x\,e^x)\,(e^x+x\,e^x)^4\,(4\,e^x+x\,e^x)\,(6\,e^x+x\,e^x)^2\\
&-13967553600\sin(x\,e^x)\,(e^x+x\,e^x)\,(2\,e^x+x\,e^x)^3\,(6\,e^x+x\,e^x)\,(7\,e^x+x\,e^x)\\
&-24443218800\cos(x\,e^x)\,(e^x+x\,e^x)^2\,(2\,e^x+x\,e^x)^3\,(6\,e^x+x\,e^x)^2\\
&+9777287520\sin(x\,e^x)\,(e^x+x\,e^x)^5\,(4\,e^x+x\,e^x)\,(6\,e^x+x\,e^x)\,(5\,e^x+x\,e^x)\\
&+4073869800\cos(x\,e^x)\,(e^x+x\,e^x)^6\,(4\,e^x+x\,e^x)^2\,(6\,e^x+x\,e^x)\\
&+17459442000\sin(x\,e^x)\,(e^x+x\,e^x)^4\,(3\,e^x+x\,e^x)^2\,(8\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)\\
&+3491888400\sin(x\,e^x)\,(e^x+x\,e^x)^5\,(3\,e^x+x\,e^x)\,(8\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)\\
&+1163962800\cos(x\,e^x)\,(e^x+x\,e^x)^6\,(3\,e^x+x\,e^x)^2\,(8\,e^x+x\,e^x)\\
&-54318264000\sin(x\,e^x)\,(2\,e^x+x\,e^x)\,(3\,e^x+x\,e^x)^4\,(6\,e^x+x\,e^x)\\
&+1629547920000\sin(x\,e^x)\,(e^x+x\,e^x)\,(2\,e^x+x\,e^x)^3\,(3\,e^x+x\,e^x)^3\,(4\,e^x+x\,e^x)\\
&+814773960000\cos(x\,e^x)\,(e^x+x\,e^x)^2\,(2\,e^x+x\,e^x)^3\,(3\,e^x+x\,e^x)^4\\
&+10475665200\cos(x\,e^x)\,(e^x+x\,e^x)^5\,(3\,e^x+x\,e^x)\,(8\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)^2\\
&-13967553600\sin(x\,e^x)\,(e^x+x\,e^x)^6\,(3\,e^x+x\,e^x)\,(7\,e^x+x\,e^x)\,(2\,e^x+x\,e^x)^2\\
&-229155176250\sin(x\,e^x)\,(e^x+x\,e^x)^4\,(2\,e^x+x\,e^x)^4\,(4\,e^x+x\,e^x)^2\\
&-40738698000\sin(x\,e^x)\,(e^x+x\,e^x)^6\,(3\,e^x+x\,e^x)^2\,(4\,e^x+x\,e^x)^2\\
&-20951330400\cos(x\,e^x)\,(e^x+x\,e^x)^7\,(2\,e^x+x\,e^x)^2\,(5\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)\\
&+10475665200\sin(x\,e^x)\,(e^x+x\,e^x)^8\,(2\,e^x+x\,e^x)^2\,(5\,e^x+x\,e^x)\,(3\,e^x+x\,e^x)\\
&+916620705000\sin(x\,e^x)\,(e^x+x\,e^x)\,(2\,e^x+x\,e^x)^4\,(3\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)^2\\
&+36664828200\cos(x\,e^x)\,(2\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)^2\,(5\,e^x+x\,e^x)^2\\
&-73329656400\sin(x\,e^x)\,(2\,e^x+x\,e^x)^3\,(4\,e^x+x\,e^x)\,(5\,e^x+x\,e^x)^2\\
&+4655851200\cos(x\,e^x)\,(e^x+x\,e^x)^6\,(3\,e^x+x\,e^x)\,(7\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)
\end{aligned}
$$

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\begin{aligned}
&+1745944200\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{8}\left(6\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{3}\\
&+116396280\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{10}\left(6\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{2}\\
&-997682400\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{8}\left(3\,e^{x}+x\,e^{x}\right)\left(7\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)\\
&+2793510720\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{2}\left(5\,e^{x}+x\,e^{x}\right)\left(7\,e^{x}+x\,e^{x}\right)\left(6\,e^{x}+x\,e^{x}\right)\\
&-11639628000\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{2}\left(2\,e^{x}+x\,e^{x}\right)^{3}\left(9\,e^{x}+x\,e^{x}\right)\left(3\,e^{x}+x\,e^{x}\right)\\
&+1163962800\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{2}\left(4\,e^{x}+x\,e^{x}\right)\left(9\,e^{x}+x\,e^{x}\right)\left(5\,e^{x}+x\,e^{x}\right)\\
&-1745944200\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{8}\left(4\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)\left(6\,e^{x}+x\,e^{x}\right)\\
&-3491888400\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{8}\left(4\,e^{x}+x\,e^{x}\right)\left(3\,e^{x}+x\,e^{x}\right)\left(5\,e^{x}+x\,e^{x}\right)\\
&+105814800\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{2}\left(12\,e^{x}+x\,e^{x}\right)\left(3\,e^{x}+x\,e^{x}\right)\\
&-13967553600\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{3}\left(6\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{2}\left(7\,e^{x}+x\,e^{x}\right)\\
&+465585120\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{10}\left(5\,e^{x}+x\,e^{x}\right)\left(3\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)\\
&-6983776800\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{4}\left(4\,e^{x}+x\,e^{x}\right)\left(7\,e^{x}+x\,e^{x}\right)\left(5\,e^{x}+x\,e^{x}\right)\\
&-1939938000\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{4}\left(3\,e^{x}+x\,e^{x}\right)\left(9\,e^{x}+x\,e^{x}\right)\left(4\,e^{x}+x\,e^{x}\right)\\
&-3491888400\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{4}\left(3\,e^{x}+x\,e^{x}\right)\left(8\,e^{x}+x\,e^{x}\right)\left(5\,e^{x}+x\,e^{x}\right)\\
&-4655851200\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{4}\left(3\,e^{x}+x\,e^{x}\right)\left(7\,e^{x}+x\,e^{x}\right)\left(6\,e^{x}+x\,e^{x}\right)\\
&+5587021440\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{5}\left(3\,e^{x}+x\,e^{x}\right)\left(7\,e^{x}+x\,e^{x}\right)\left(5\,e^{x}+x\,e^{x}\right)\\
&-4888643760\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{4}\left(5\,e^{x}+x\,e^{x}\right)^{2}\left(6\,e^{x}+x\,e^{x}\right)\\
&-41902660800\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{2}\left(5\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{3}\left(7\,e^{x}+x\,e^{x}\right)\\
&-26189163000\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{2}\left(4\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{3}\left(8\,e^{x}+x\,e^{x}\right)\\
&+69837768000\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{3}\left(4\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{3}\left(7\,e^{x}+x\,e^{x}\right)\\
&-7759752000\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{3}\left(3\,e^{x}+x\,e^{x}\right)^{2}\left(9\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)\\
&+34918884000\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{3}\left(3\,e^{x}+x\,e^{x}\right)\left(8\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{3}\\
&-1163962800\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{8}\left(3\,e^{x}+x\,e^{x}\right)^{2}\left(6\,e^{x}+x\,e^{x}\right)\\
&-1047566520\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{8}\left(2\,e^{x}+x\,e^{x}\right)\left(5\,e^{x}+x\,e^{x}\right)^{2}\\
&+35271600\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{2}\left(3\,e^{x}+x\,e^{x}\right)^{2}\left(12\,e^{x}+x\,e^{x}\right)\\
&+52907400\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{2}\left(2\,e^{x}+x\,e^{x}\right)\left(12\,e^{x}+x\,e^{x}\right)\left(4\,e^{x}+x\,e^{x}\right)\\
&-2327925600\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{3}\left(3\,e^{x}+x\,e^{x}\right)\left(6\,e^{x}+x\,e^{x}\right)\left(8\,e^{x}+x\,e^{x}\right)\\
&-5237832600\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{2}\left(6\,e^{x}+x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)^{2}\left(8\,e^{x}+x\,e^{x}\right)\\
&+217273056000\cos\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{3}\left(2\,e^{x}+x\,e^{x}\right)\left(3\,e^{x}+x\,e^{x}\right)^{5}\\
&+1745944200\sin\left(x\,e^{x}\right)\left(2\,e^{x}+x\,e^{x}\right)\left(4\,e^{x}+x\,e^{x}\right)\left(8\,e^{x}+x\,e^{x}\right)\left(6\,e^{x}+x\,e^{x}\right)\\
&+775975200\sin\left(x\,e^{x}\right)\left(e^{x}+x\,e^{x}\right)^{9}\left(5\,e^{x}+x\,e^{x}\right)\left(3\,e^{x}+x\,e^{x}\right)^{2}
\end{aligned}
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\begin{aligned}
&- 10475665200 \sin(x e^x) \left(e^x + x e^x\right) \left(5 e^x + x e^x\right) \left(2 e^x + x e^x\right)^3 \left(8 e^x + x e^x\right) \\
&- 10475665200 \cos(x e^x) \left(e^x + x e^x\right)^3 \left(5 e^x + x e^x\right) \left(2 e^x + x e^x\right)^2 \left(8 e^x + x e^x\right) \\
&- 5819814000 \cos(x e^x) \left(e^x + x e^x\right)^3 \left(4 e^x + x e^x\right) \left(2 e^x + x e^x\right)^2 \left(9 e^x + x e^x\right) \\
&+ 13094581500 \sin(x e^x) \left(e^x + x e^x\right)^4 \left(4 e^x + x e^x\right) \left(2 e^x + x e^x\right)^2 \left(8 e^x + x e^x\right) \\
&+ 423259200 \cos(x e^x) \left(e^x + x e^x\right) \left(3 e^x + x e^x\right)^2 \left(11 e^x + x e^x\right) \left(2 e^x + x e^x\right) \\
&- 2327925600 \sin(x e^x) \left(e^x + x e^x\right)^2 \left(3 e^x + x e^x\right)^2 \left(10 e^x + x e^x\right) \left(2 e^x + x e^x\right) \\
&- 2327925600 \cos(x e^x) \left(e^x + x e^x\right)^3 \left(3 e^x + x e^x\right) \left(10 e^x + x e^x\right) \left(2 e^x + x e^x\right)^2 \\
&+ 5819814000 \sin(x e^x) \left(e^x + x e^x\right)^4 \left(3 e^x + x e^x\right) \left(9 e^x + x e^x\right) \left(2 e^x + x e^x\right)^2 \\
&+ 1745944200 \cos(x e^x) \left(e^x + x e^x\right)^2 \left(4 e^x + x e^x\right) \left(8 e^x + x e^x\right) \left(6 e^x + x e^x\right) \\
&- 3491888400 \sin(x e^x) \left(e^x + x e^x\right)^3 \left(4 e^x + x e^x\right) \left(8 e^x + x e^x\right) \left(5 e^x + x e^x\right) \\
&+ 211629600 \cos(x e^x) \left(e^x + x e^x\right)^2 \left(3 e^x + x e^x\right) \left(11 e^x + x e^x\right) \left(4 e^x + x e^x\right) \\
&+ 465585120 \cos(x e^x) \left(e^x + x e^x\right)^2 \left(3 e^x + x e^x\right) \left(10 e^x + x e^x\right) \left(5 e^x + x e^x\right) \\
&- 775975200 \sin(x e^x) \left(e^x + x e^x\right)^3 \left(3 e^x + x e^x\right) \left(10 e^x + x e^x\right) \left(4 e^x + x e^x\right) \\
&+ 775975200 \cos(x e^x) \left(e^x + x e^x\right)^2 \left(3 e^x + x e^x\right) \left(9 e^x + x e^x\right) \left(6 e^x + x e^x\right) \\
&- 1551950400 \sin(x e^x) \left(e^x + x e^x\right)^3 \left(3 e^x + x e^x\right) \left(9 e^x + x e^x\right) \left(5 e^x + x e^x\right) \\
&+ 1163962800 \cos(x e^x) \left(e^x + x e^x\right) \left(6 e^x + x e^x\right) \left(2 e^x + x e^x\right)^2 \left(9 e^x + x e^x\right) \\
&+ 698377680 \cos(x e^x) \left(e^x + x e^x\right) \left(5 e^x + x e^x\right) \left(2 e^x + x e^x\right)^2 \left(10 e^x + x e^x\right) \\
&- 3491888400 \sin(x e^x) \left(e^x + x e^x\right)^2 \left(5 e^x + x e^x\right) \left(2 e^x + x e^x\right)^2 \left(9 e^x + x e^x\right) \\
&+ 317444400 \cos(x e^x) \left(e^x + x e^x\right) \left(4 e^x + x e^x\right) \left(2 e^x + x e^x\right)^2 \left(11 e^x + x e^x\right) \\
&- 1745944200 \sin(x e^x) \left(e^x + x e^x\right)^2 \left(4 e^x + x e^x\right) \left(2 e^x + x e^x\right)^2 \left(10 e^x + x e^x\right) \\
&- 1745944200 \cos(x e^x) \left(e^x + x e^x\right)^4 \left(6 e^x + x e^x\right) \left(2 e^x + x e^x\right) \left(8 e^x + x e^x\right) \\
&+ 2793510720 \sin(x e^x) \left(e^x + x e^x\right)^5 \left(6 e^x + x e^x\right) \left(2 e^x + x e^x\right) \left(7 e^x + x e^x\right) \\
&- 1163962800 \cos(x e^x) \left(e^x + x e^x\right)^4 \left(5 e^x + x e^x\right) \left(2 e^x + x e^x\right) \left(9 e^x + x e^x\right) \\
&+ 2095133040 \sin(x e^x) \left(e^x + x e^x\right)^5 \left(5 e^x + x e^x\right) \left(2 e^x + x e^x\right) \left(8 e^x + x e^x\right) \\
&- 634888800 \sin(x e^x) \left(e^x + x e^x\right)^2 \left(3 e^x + x e^x\right) \left(11 e^x + x e^x\right) \left(2 e^x + x e^x\right)^2 \\
&- 211629600 \cos(x e^x) \left(e^x + x e^x\right)^4 \left(3 e^x + x e^x\right) \left(11 e^x + x e^x\right) \left(2 e^x + x e^x\right) \\
&- 387987600 \cos(x e^x) \left(e^x + x e^x\right)^4 \left(3 e^x + x e^x\right)^2 \left(10 e^x + x e^x\right) \\
&+ 997682400 \sin(x e^x) \left(2 e^x + x e^x\right) \left(4 e^x + x e^x\right) \left(7 e^x + x e^x\right)^2 \\
&+ 155195040 \sin(x e^x) \left(e^x + x e^x\right) \left(3 e^x + x e^x\right) \left(6 e^x + x e^x\right) \left(10 e^x + x e^x\right) \\
&- 325909584000 \cos(x e^x) \left(e^x + x e^x\right)^5 \left(2 e^x + x e^x\right)^3 \left(3 e^x + x e^x\right)^3 \\
&- 54318264000 \cos(x e^x) \left(e^x + x e^x\right)^6 \left(3 e^x + x e^x\right)^4 \left(2 e^x + x e^x\right)
\end{aligned}
$$

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\begin{aligned}
&- 77597520 \cos(x e^x) \left(e^x + x e^x\right)^9 \left(5 e^x + x e^x\right) \left(6 e^x + x e^x\right) \\
&- 99768240 \cos(x e^x) \left(e^x + x e^x\right)^5 \left(7 e^x + x e^x\right) \left(8 e^x + x e^x\right) \\
&+ 46558512000 \sin(x e^x) \left(e^x + x e^x\right)^7 \left(3 e^x + x e^x\right)^3 \left(2 e^x + x e^x\right)^2 \\
&+ 2586584000 \cos(x e^x) \left(e^x + x e^x\right)^9 \left(3 e^x + x e^x\right)^3 \left(2 e^x + x e^x\right) \\
&+ 387987600 \cos(x e^x) \left(e^x + x e^x\right)^{10} \left(3 e^x + x e^x\right)^2 \left(4 e^x + x e^x\right) \\
&+ 290990700 \cos(x e^x) \left(e^x + x e^x\right)^{10} \left(4 e^x + x e^x\right)^2 \left(2 e^x + x e^x\right) \\
&+ 6547290750 \cos(x e^x) \left(e^x + x e^x\right)^4 \left(2 e^x + x e^x\right)^4 \left(8 e^x + x e^x\right) \\
&- 775975200 \sin(x e^x) \left(e^x + x e^x\right)^3 \left(6 e^x + x e^x\right) \left(9 e^x + x e^x\right) \left(2 e^x + x e^x\right) \\
&- 77597520 \cos(x e^x) \left(e^x + x e^x\right)^5 \left(6 e^x + x e^x\right) \left(9 e^x + x e^x\right) \\
&+ 775975200 \sin(x e^x) \left(2 e^x + x e^x\right) \left(6 e^x + x e^x\right) \left(9 e^x + x e^x\right) \left(3 e^x + x e^x\right) \\
&+ 465585120 \sin(x e^x) \left(2 e^x + x e^x\right) \left(5 e^x + x e^x\right) \left(10 e^x + x e^x\right) \left(3 e^x + x e^x\right) \\
&+ 211629600 \sin(x e^x) \left(2 e^x + x e^x\right) \left(4 e^x + x e^x\right) \left(11 e^x + x e^x\right) \left(3 e^x + x e^x\right) \\
&- 36664828200 \sin(x e^x) \left(e^x + x e^x\right)^4 \left(2 e^x + x e^x\right)^5 \left(6 e^x + x e^x\right) \\
&- 12221609400 \cos(x e^x) \left(e^x + x e^x\right)^6 \left(2 e^x + x e^x\right)^4 \left(6 e^x + x e^x\right) \\
&+ 498841200 \sin(x e^x) \left(e^x + x e^x\right) \left(4 e^x + x e^x\right) \left(7 e^x + x e^x\right) \left(8 e^x + x e^x\right) \\
&+ 221707200 \sin(x e^x) \left(e^x + x e^x\right) \left(3 e^x + x e^x\right) \left(7 e^x + x e^x\right) \left(9 e^x + x e^x\right) \\
&+ 232792560 \cos(x e^x) \left(e^x + x e^x\right)^2 \left(6 e^x + x e^x\right) \left(10 e^x + x e^x\right) \left(2 e^x + x e^x\right) \\
&+ 126977760 \cos(x e^x) \left(e^x + x e^x\right)^2 \left(5 e^x + x e^x\right) \left(11 e^x + x e^x\right) \left(2 e^x + x e^x\right) \\
&- 465585120 \sin(x e^x) \left(e^x + x e^x\right)^3 \left(5 e^x + x e^x\right) \left(10 e^x + x e^x\right) \left(2 e^x + x e^x\right) \\
&- 46558512 \cos(x e^x) \left(e^x + x e^x\right)^5 \left(5 e^x + x e^x\right) \left(10 e^x + x e^x\right) \\
&- 211629600 \sin(x e^x) \left(e^x + x e^x\right)^3 \left(4 e^x + x e^x\right) \left(11 e^x + x e^x\right) \left(2 e^x + x e^x\right) \\
&+ 35271600 \sin(x e^x) \left(e^x + x e^x\right) \left(3 e^x + x e^x\right) \left(4 e^x + x e^x\right) \left(12 e^x + x e^x\right) \\
&+ 84651840 \sin(x e^x) \left(e^x + x e^x\right) \left(3 e^x + x e^x\right) \left(5 e^x + x e^x\right) \left(11 e^x + x e^x\right) \\
&+ 997682400 \sin(x e^x) \left(2 e^x + x e^x\right) \left(3 e^x + x e^x\right) \left(8 e^x + x e^x\right) \left(7 e^x + x e^x\right) \\
&+ 10475665200 \sin(x e^x) \left(e^x + x e^x\right)^7 \left(5 e^x + x e^x\right) \left(2 e^x + x e^x\right)^4 \\
&+ 1163962800 \cos(x e^x) \left(e^x + x e^x\right)^9 \left(5 e^x + x e^x\right) \left(2 e^x + x e^x\right)^3 \\
&- 1163962800 \sin(x e^x) \left(e^x + x e^x\right)^{10} \left(3 e^x + x e^x\right)^2 \left(2 e^x + x e^x\right)^2 \\
&+ 35271600 \sin(x e^x) \left(2 e^x + x e^x\right) \left(12 e^x + x e^x\right) \left(3 e^x + x e^x\right)^2 \\
&+ 1163962800 \cos(x e^x) \left(e^x + x e^x\right)^5 \left(9 e^x + x e^x\right) \left(2 e^x + x e^x\right)^3 \\
&- 43997793840 \cos(x e^x) \left(e^x + x e^x\right)^5 \left(2 e^x + x e^x\right)^5 \left(5 e^x + x e^x\right) \\
&+ 6547290750 \cos(x e^x) \left(e^x + x e^x\right)^8 \left(2 e^x + x e^x\right)^4 \left(4 e^x + x e^x\right) \\
&+ 17459442000 \cos(x e^x) \left(e^x + x e^x\right)^8 \left(2 e^x + x e^x\right)^3 \left(3 e^x + x e^x\right)^2
\end{aligned}
$$

$$-21162960\cos(x\,e^x)\,(e^x+x\,e^x)^5\,(11\,e^x+x\,e^x)\,(4\,e^x+x\,e^x)$$
$$+116396280\sin(x\,e^x)\,(e^x+x\,e^x)^6\,(6\,e^x+x\,e^x)\,(8\,e^x+x\,e^x)$$
$$-38798760\sin(x\,e^x)\,(e^x+x\,e^x)^4\,(6\,e^x+x\,e^x)\,(10\,e^x+x\,e^x)$$
$$-141086400\sin(x\,e^x)\,(e^x+x\,e^x)^3\,(3\,e^x+x\,e^x)^2\,(11\,e^x+x\,e^x)$$
$$+166280400\sin(x\,e^x)\,(2\,e^x+x\,e^x)^2\,(7\,e^x+x\,e^x)\,(9\,e^x+x\,e^x)$$
$$+116396280\sin(x\,e^x)\,(2\,e^x+x\,e^x)^2\,(6\,e^x+x\,e^x)\,(10\,e^x+x\,e^x)$$
$$+63488880\sin(x\,e^x)\,(2\,e^x+x\,e^x)^2\,(5\,e^x+x\,e^x)\,(11\,e^x+x\,e^x)$$
$$+26453700\sin(x\,e^x)\,(2\,e^x+x\,e^x)^2\,(4\,e^x+x\,e^x)\,(12\,e^x+x\,e^x)$$
$$-10475665200\sin(x\,e^x)\,(e^x+x\,e^x)^5\,(2\,e^x+x\,e^x)^4\,(7\,e^x+x\,e^x)$$
$$-211629600\cos(x\,e^x)\,(e^x+x\,e^x)^3\,(2\,e^x+x\,e^x)^3\,(11\,e^x+x\,e^x)$$
$$-1309458150\sin(x\,e^x)\,(e^x+x\,e^x)^8\,(2\,e^x+x\,e^x)^6-2909907000\sin(x\,e^x)\,(e^x$$
$$+x\,e^x)^9\,(2\,e^x+x\,e^x)^4\,(3\,e^x+x\,e^x)-174594420\cos(x\,e^x)\,(e^x+x\,e^x)^{10}\,(2\,e^x+x\,e^x)^5$$
$$-21162960\sin(x\,e^x)\,(e^x+x\,e^x)^4\,(5\,e^x+x\,e^x)\,(11\,e^x+x\,e^x)$$

Um sistema pioneiro foi desenvolvido pelo Prêmio Nobel de Física de 1963, Martin Veltman, que construiu o programa *Schoonship* para cálculos em Física de Altas Energias. Os CAS's começaram a ser desenvolvidos e difundidos a partir da década de 1970. Inicialmente um ramo da pesquisa em inteligência artificial, atualmente é um campo de pesquisa independente desta.

Os primeiros sistemas de uso geral de maior difusão foram o Reduce, Derive, e Macsyma, que ainda hoje estão disponíveis. Atualmente, os líderes de mercado são o Maple e o Mathematica, seguidos pelos MuPAD e MathCad; são utilizados por matemáticos, físicos, engenheiros e outros profissionais. Há sistemas de uso mais específico, acadêmicos, geralmente gratuitos.

II. Operações básicas e comandos elementares

```
> 1+1;
```

$$2 \qquad \textbf{(2.1)}$$

```
> 3-4;
```

$$-1 \qquad \textbf{(2.2)}$$

```
> 4/2;
```

$$2 \qquad \textbf{(2.3)}$$

```
> sqrt(16);
```

$$4 \qquad \textbf{(2.4)}$$

```
> 8*7;
```

$$56 \qquad \textbf{(2.5)}$$

```
> a+b;
```

$$a+b \qquad \textbf{(2.6)}$$

```
> 2/3;
```

$$\frac{2}{3} \tag{2.7}$$

Números inteiros versus números não-inteiros

```
> 2./3;
```

$$0.6666666667 \tag{2.8}$$

```
> evalf(2/3);
```

$$0.6666666667 \tag{2.9}$$

Número de casas decimais padrão 10.

```
> Digits:=50;
```

$$Digits := 50 \tag{2.10}$$

```
> evalf(2/3);
```

$$0.66666666666666666666666666666666666666666666666667 \tag{2.11}$$

```
> evalf(Pi);
```

$$3.1415926535897932384626433832795028841971693993751 \tag{2.12}$$

```
> evalf(exp(1));
```

$$2.7182818284590452353602874713526624977572470937000 \tag{2.13}$$

```
> restart:
```

III. Manipulando expressões algébricas

Examinando os comandos SUBS, EXPAND, SIMPLIFY, COLLECT

```
> f:=x^3+2*x^2-5*x+4;
```

$$f := x^3 + 2\,x^2 - 5\,x + 4 \tag{3.1}$$

```
> subs(x=4,f);
```

$$80 \tag{3.2}$$

```
> g:=sin(a+b);
```

$$g := \sin(a + b) \tag{3.3}$$

```
> expand(g);
```

$$\sin(a)\,\cos(b) + \cos(a)\,\sin(b) \tag{3.4}$$

```
> sin(a)^2+cos(a)^2;
```

$$\sin(a)^2 + \cos(a)^2 \tag{3.5}$$

```
> simplify(sin(a)^2+cos(a)^2);
```

$$1 \tag{3.6}$$

```
> h:=a*ln(x)-ln(x)*x-x;
```

$$h := a\,\ln(x) - \ln(x)\,x - x \tag{3.7}$$

```
> collect(h, ln(x));
```

$$(a - x)\,\ln(x) - x \tag{3.8}$$

```
> g := x^2*exp(x)-2*x*exp(x)+2*exp(x)-x^2/exp(x)-2*x/exp(x)
```

```
-2/exp(x);
```

$$g := x^2 e^x - 2 x e^x + 2 e^x - \frac{x^2}{e^x} - \frac{2 x}{e^x} - \frac{2}{e^x} \quad \textbf{(3.9)}$$

```
> collect(g, exp(x));
```

$$\left(2 + x^2 - 2 x\right) e^x + \frac{-2 x - 2 - x^2}{e^x} \quad \textbf{(3.10)}$$

```
> restart:
```

IV. Gráfico de funções de uma ou mais variáveis

O Maple possui um pacote denominado PLOTS que contém um conjunto de ferramentas para construção de gráficos de funções em uma ou mais variáveis. Vamos conhecê-lo.

```
> with(plots);
```

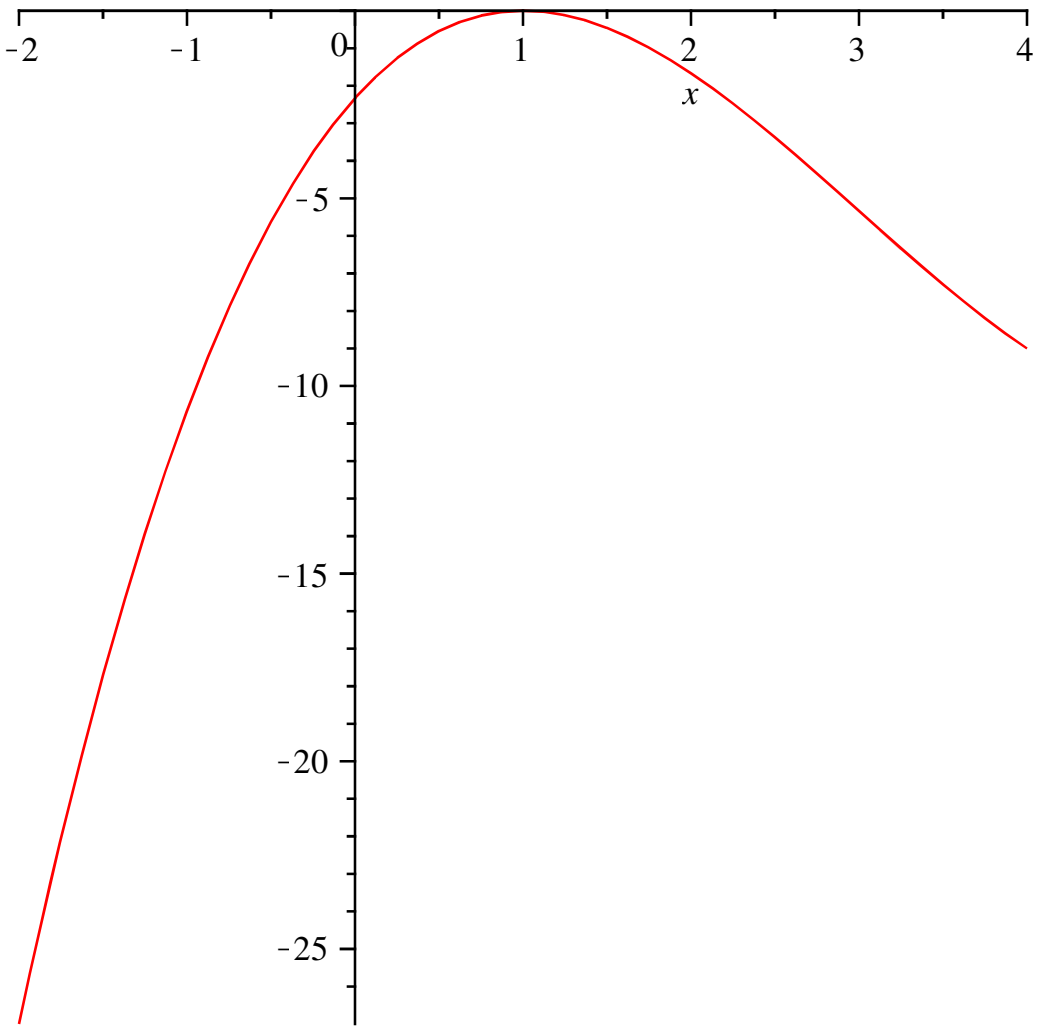
[*animate*, *animate3d*, *animatecurve*, *arrow*, *changecoords*, *complexplot*, *complexplot3d*, *conformal*, *conformal3d*, *contourplot*, *contourplot3d*, *coordplot*, *coordplot3d*, *densityplot*, *display*, *dualaxisplot*, *fieldplot*, *fieldplot3d*, *gradplot*, *gradplot3d*, *graphplot3d*, *implicitplot*, *implicitplot3d*, *inequal*, *interactive*, *interactiveparams*, *intersectplot*, *listcontplot*, *listcontplot3d*, *listdensityplot*, *listplot*, *listplot3d*, *loglogplot*, *logplot*, *matrixplot*, *multiple*, *odeplot*, *pareto*, *plotcompare*, *pointplot*, *pointplot3d*, *polarplot*, *polygonplot*, *polygonplot3d*, *polyhedra_supported*, *polyhedraplot*, *rootlocus*, *semilogplot*, *setcolors*, *setoptions*, *setoptions3d*, *spacecurve*, *sparsematrixplot*, *surfdata*, *textplot*, *textplot3d*, *tubeplot*] **(4.1)**

```
> f:=1/3*x^3-6/2*x^2+5*x-7/3;
```

$$f := \frac{1}{3} x^3 - 3 x^2 + 5 x - \frac{7}{3} \quad \textbf{(4.2)}$$

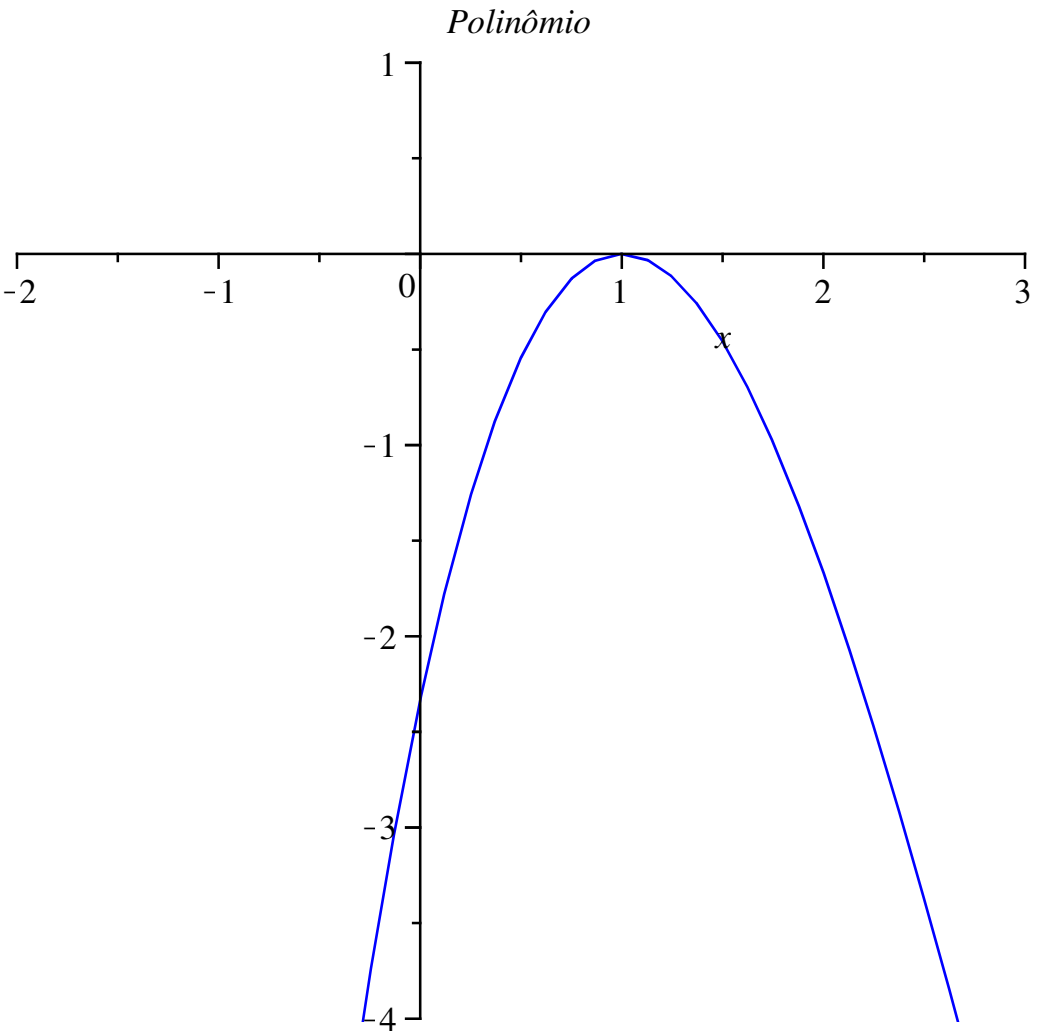
O Maple pode facilmente plotar o gráfico desta função polinomial

```
> plot(f,x=-2..4);
```

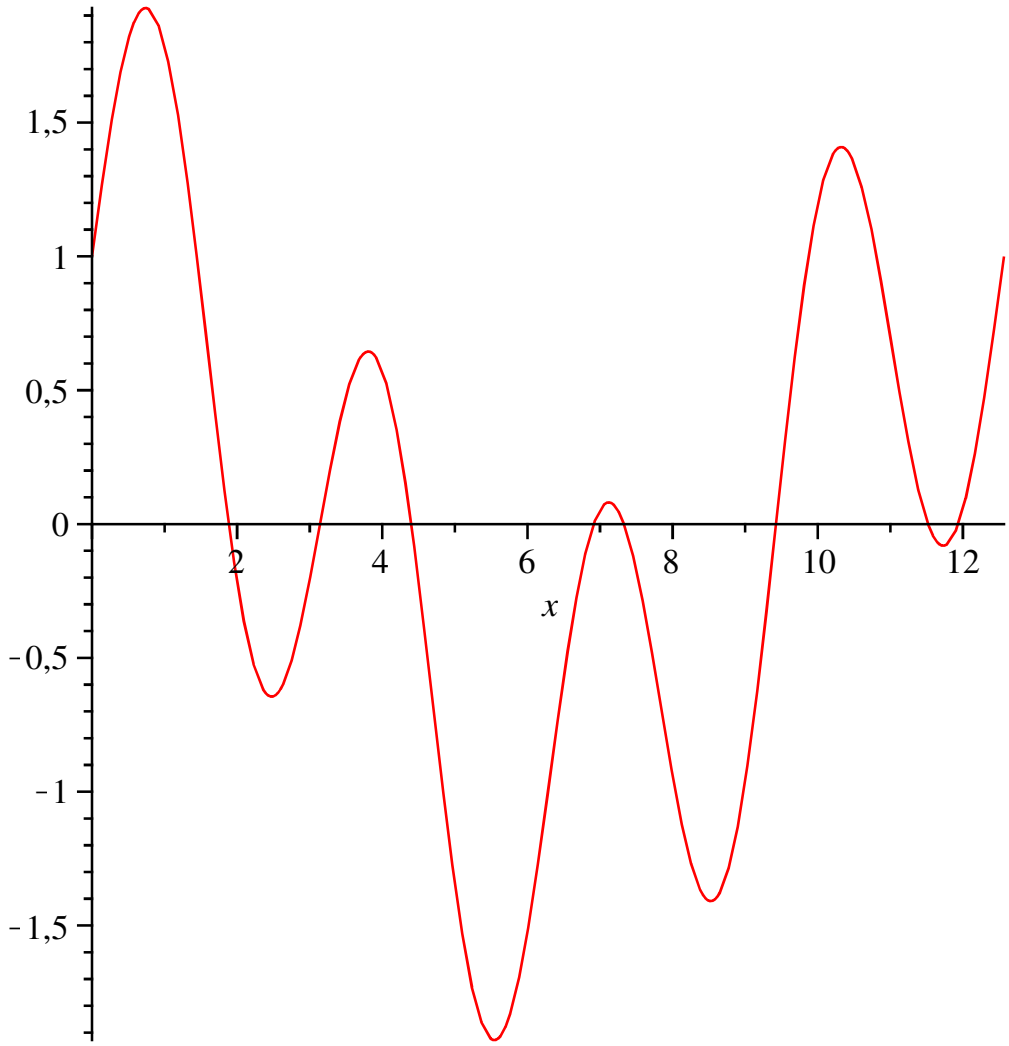


Mas como saber se o comportamento da função constitui uma curva com concavidade voltada para baixo? A resposta a essa pergunta será respondida mais adiante. Ainda nesta função.

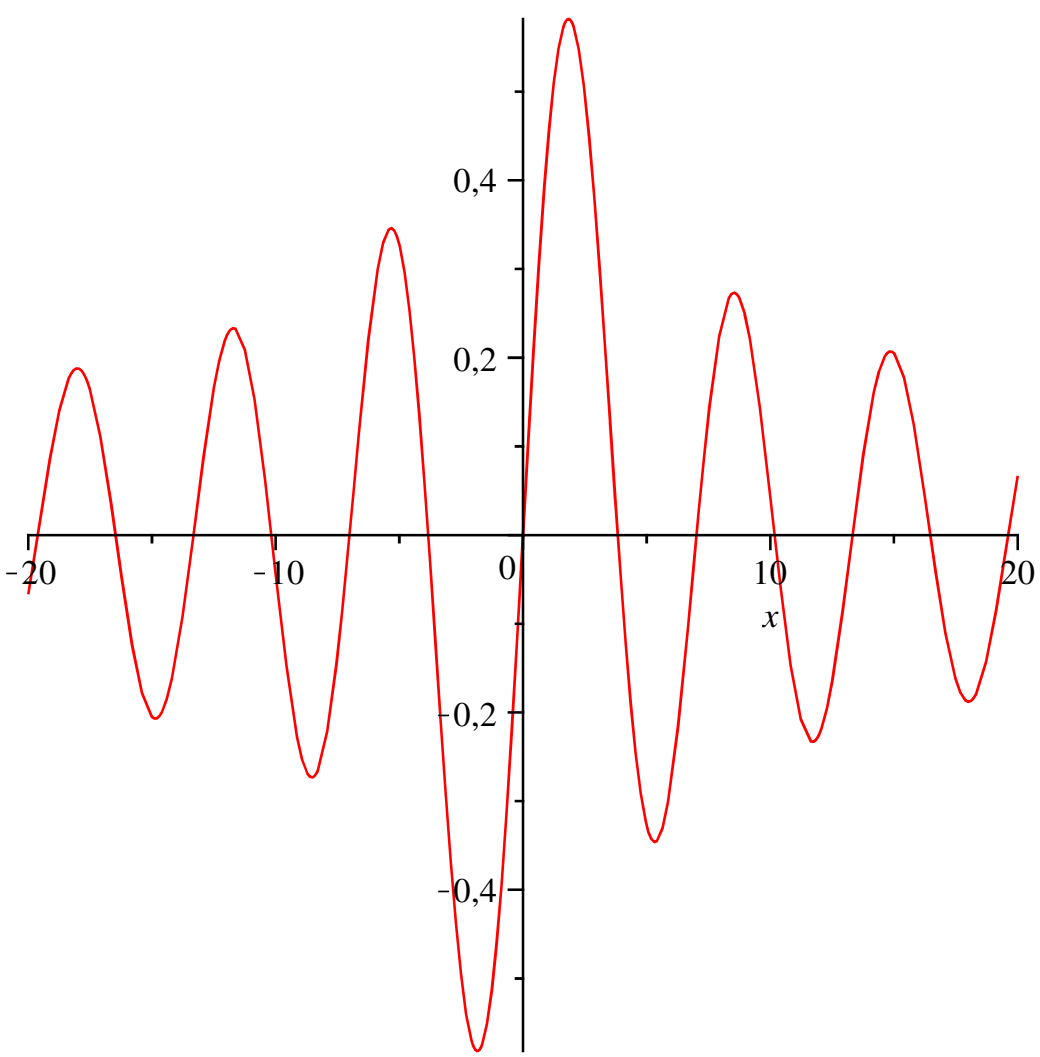
```
> plot(f,x=-2..4,view=[-2..3,-4..1],color=blue,title=
  `Polinômio`);
```



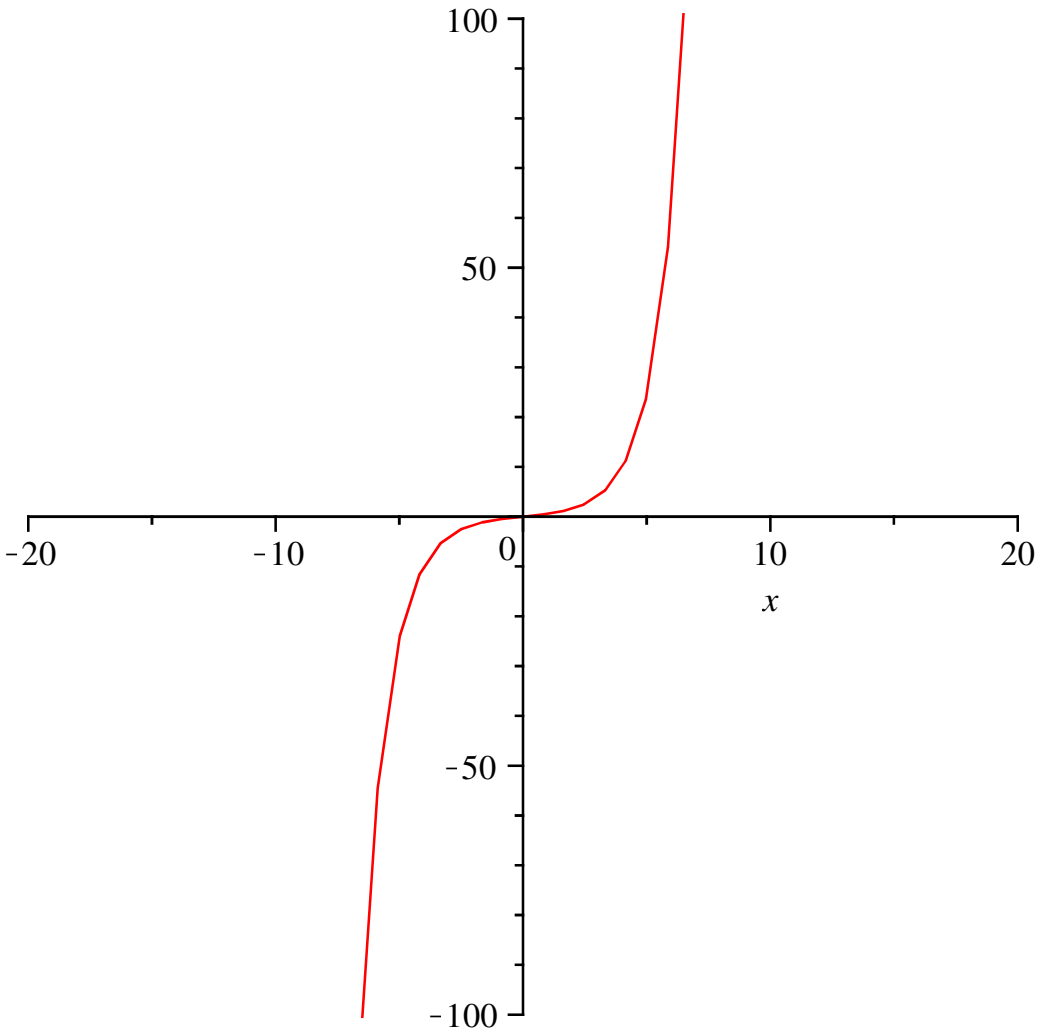

```
> plot(cos((1/2)*x)+sin(2*x),x = 0 .. 4*Pi);
```



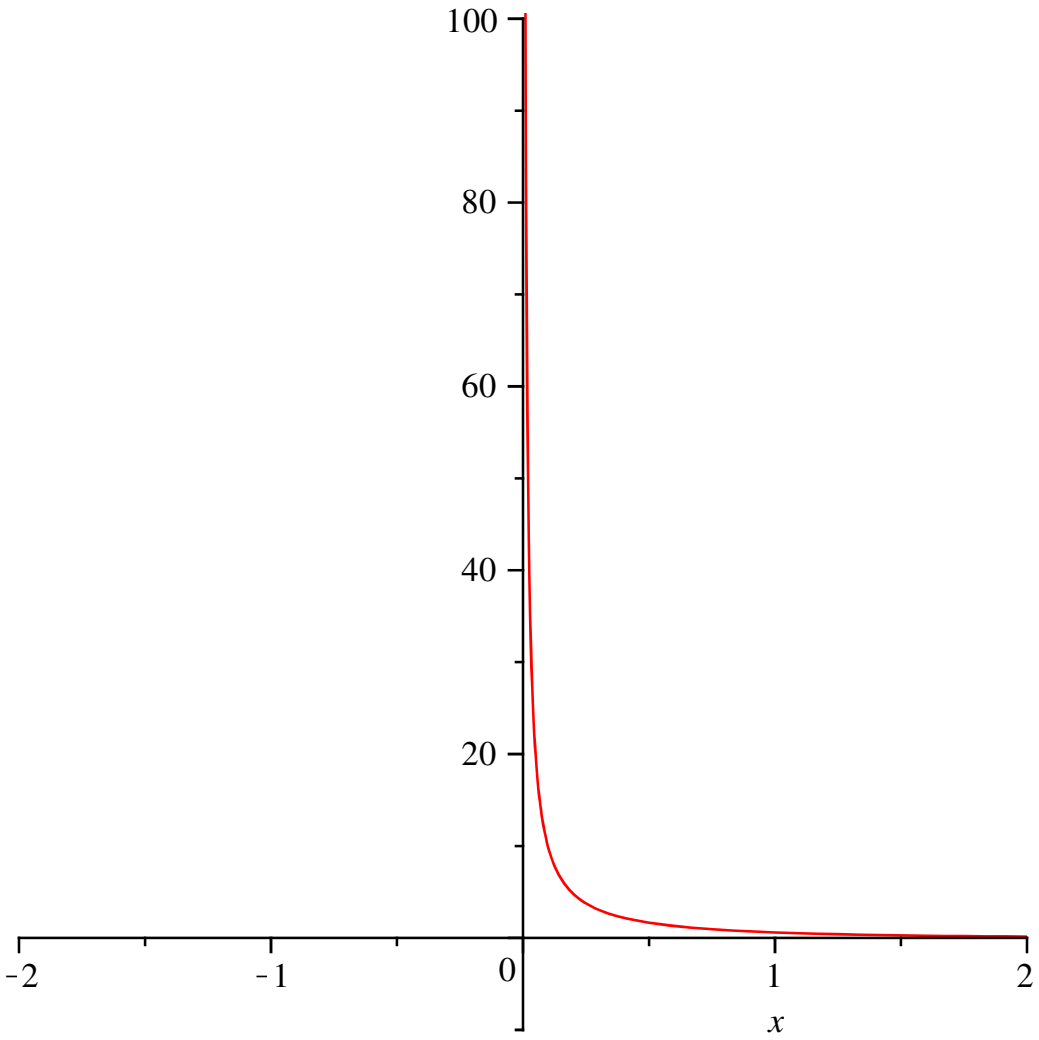

```
> plot(BesselJ(1, x), x = -20 .. 20);
```



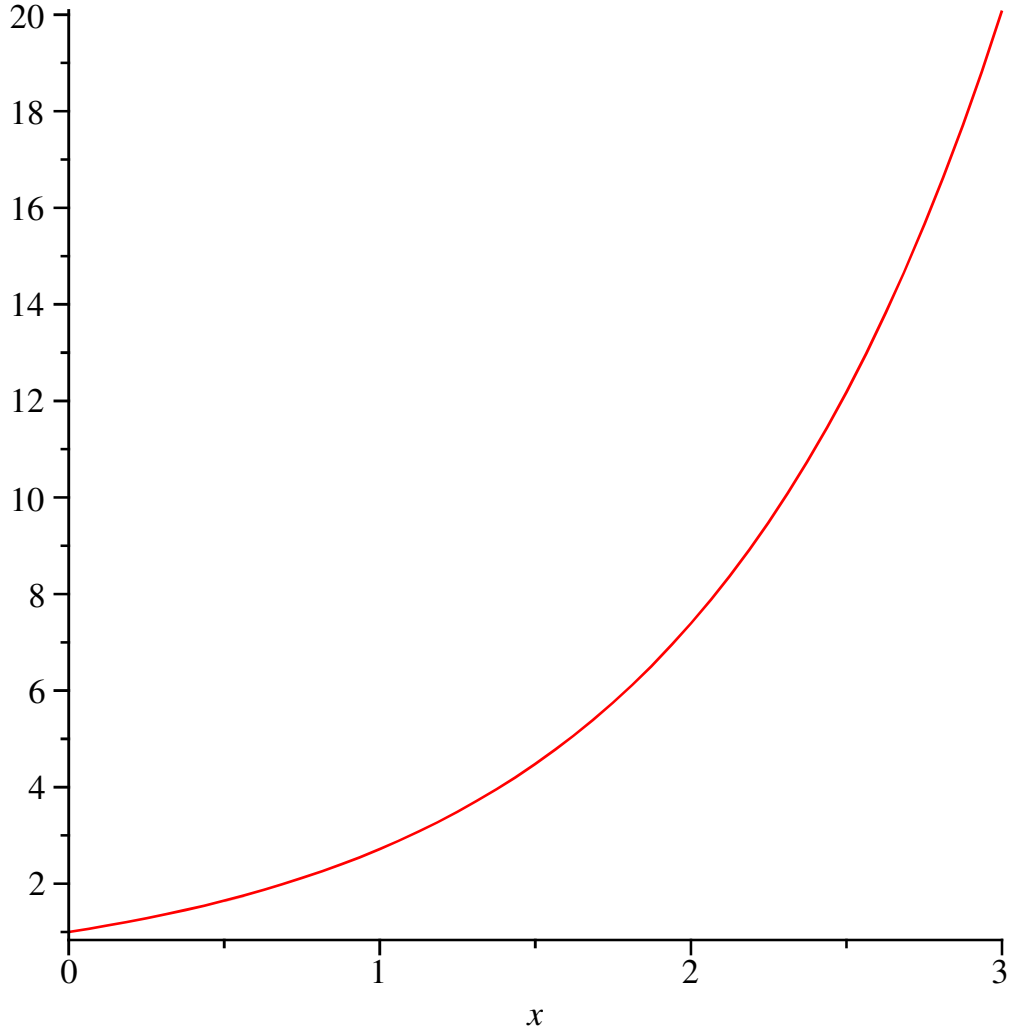

```
> plot(BesselI(1, x), x = -20 .. 20,-100..100);
```



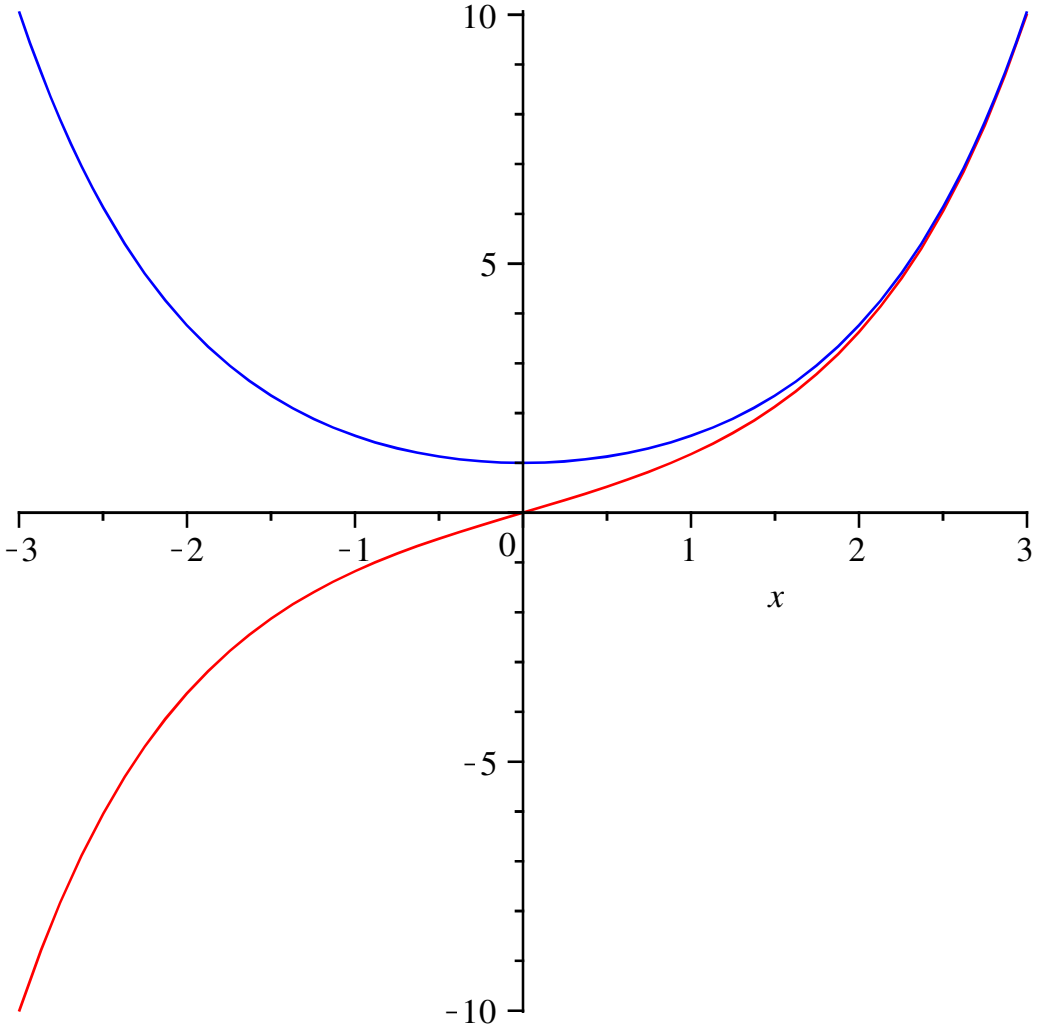

```
> plot(BesselK(1, x), x = -2 .. 2,-10..100);
```



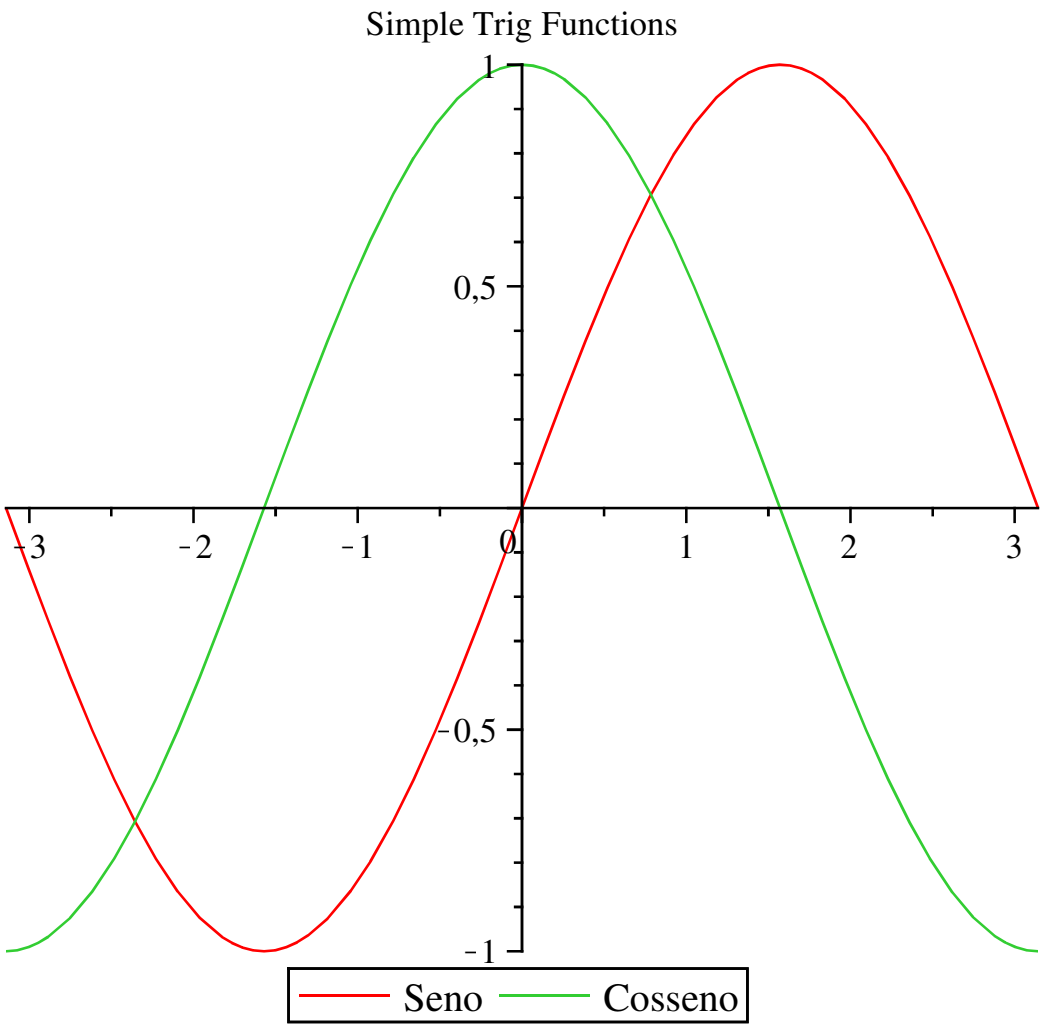

```
> plot(exp(x),x=0..3);
```



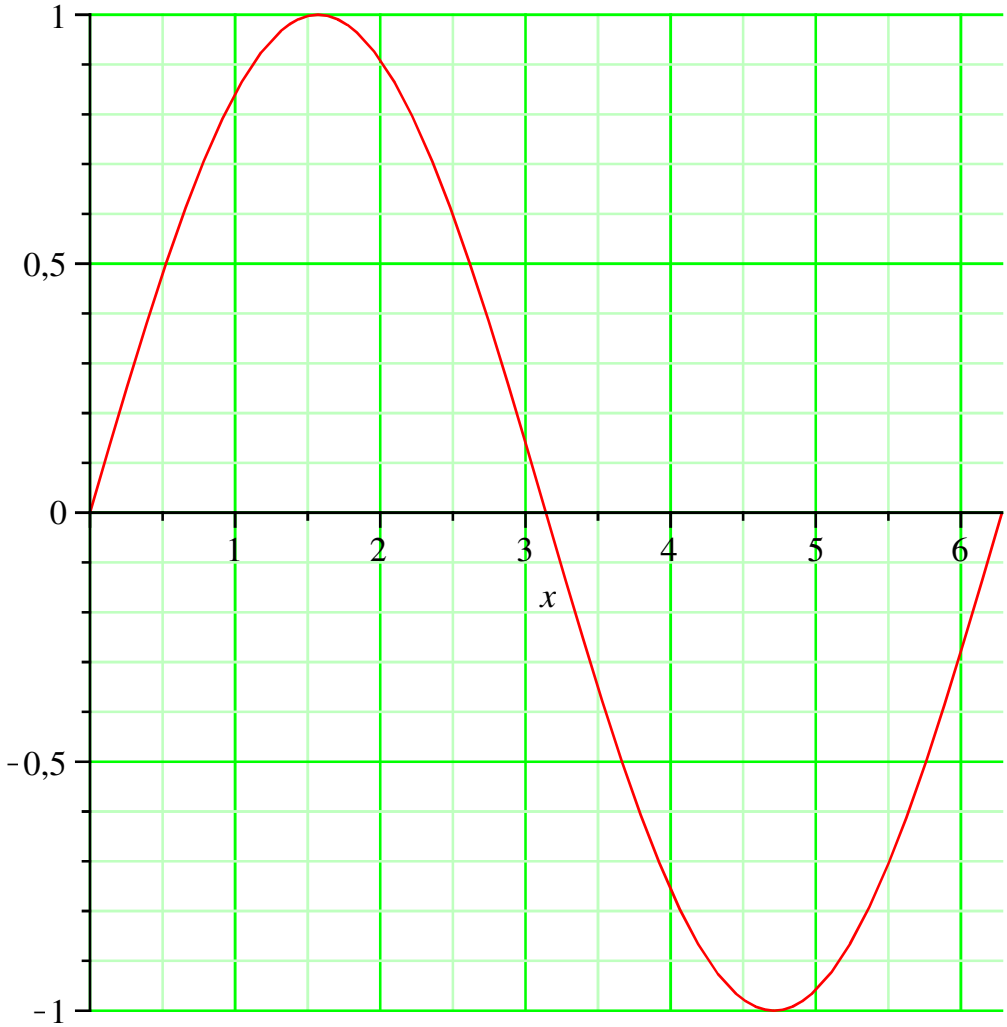

```
> plot([sinh(x),cosh(x)],x=-3..3,color=[red,blue]);
```




```
> plot([sin, cos], -Pi .. Pi, title = "Simple Trig Functions",
  legend = ["Seno", "Cosseno"]);
```




```
> plot(sin(x), x = 0 .. 2*Pi, axis = [gridlines = [colour =
  green, majorlines = 2]]);
```



Construindo o gráfico a partir de um arquivo numérico.

```
> #currentdir("C:\\Users\\User\\Desktop\\minicurso maple");
> currentdir("C:\\Users\\Windows 7\\Desktop\\minicurso-maple");
```

"C:\Users\Windows 7\Desktop\minicurso-maple" **(4.3)**

```
> currentdir();
```

"C:\Users\Windows 7\Desktop\minicurso-maple" **(4.4)**

```
> readdata(`pacoteE135alpha04.dat`,2);
```

(4.5)

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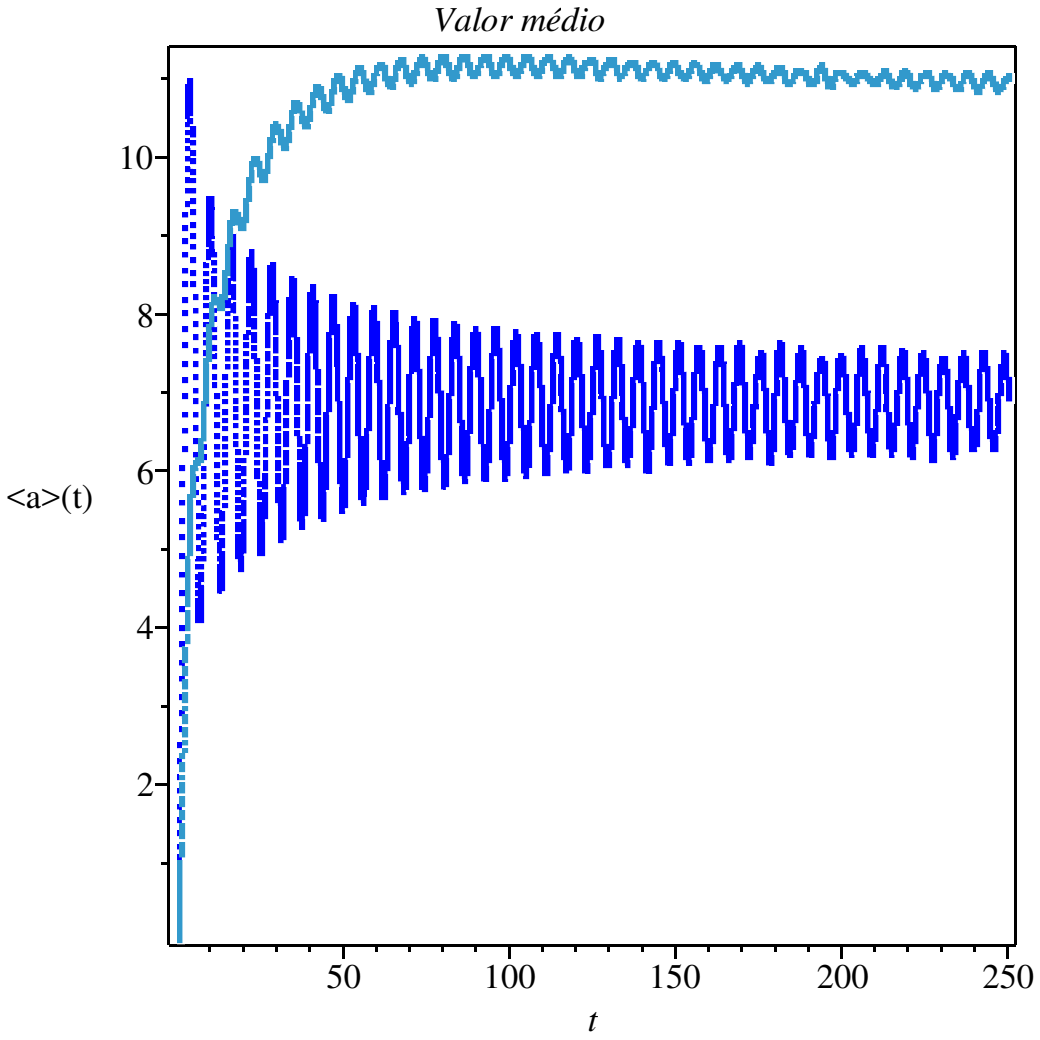
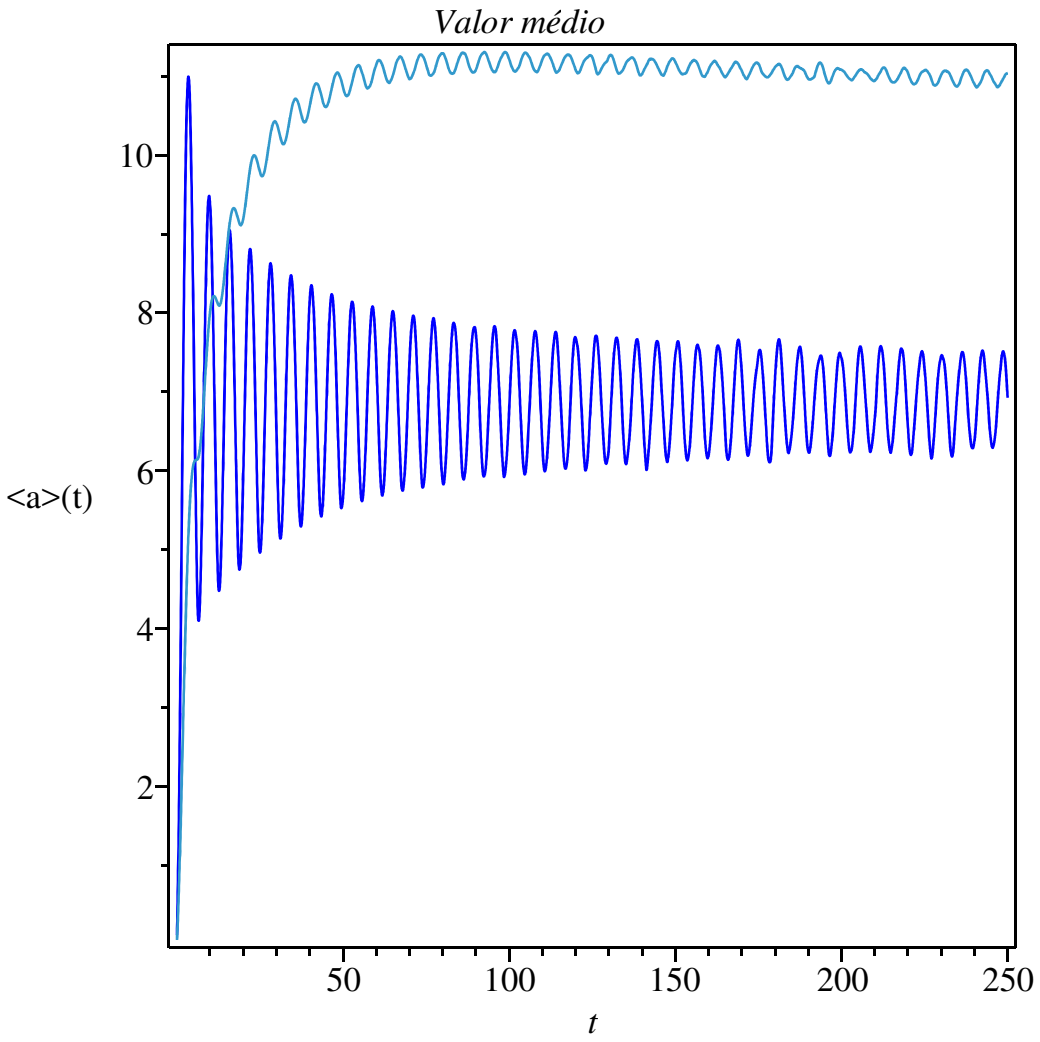
[49.96363636, 0.], [49.97272727, 0.], [49.98181818, 0.], [49.99090909, 0.],
[50.00000000, 0.]]
> aux1:=readdata(`amedioE25alpha05.dat`,2):
> aux2:=readdata(`amedioE145alpha04.dat`,2):
> aux3:=readdata(`pacoteE125alpha04.dat`,2):
> aux4:=readdata(`pacoteE135alpha04.dat`,2):
> w1:=pointplot(aux1,style=point,axes=box,symbol=point,color=
  blue,labels=[t,"<a>(t)"]):
```

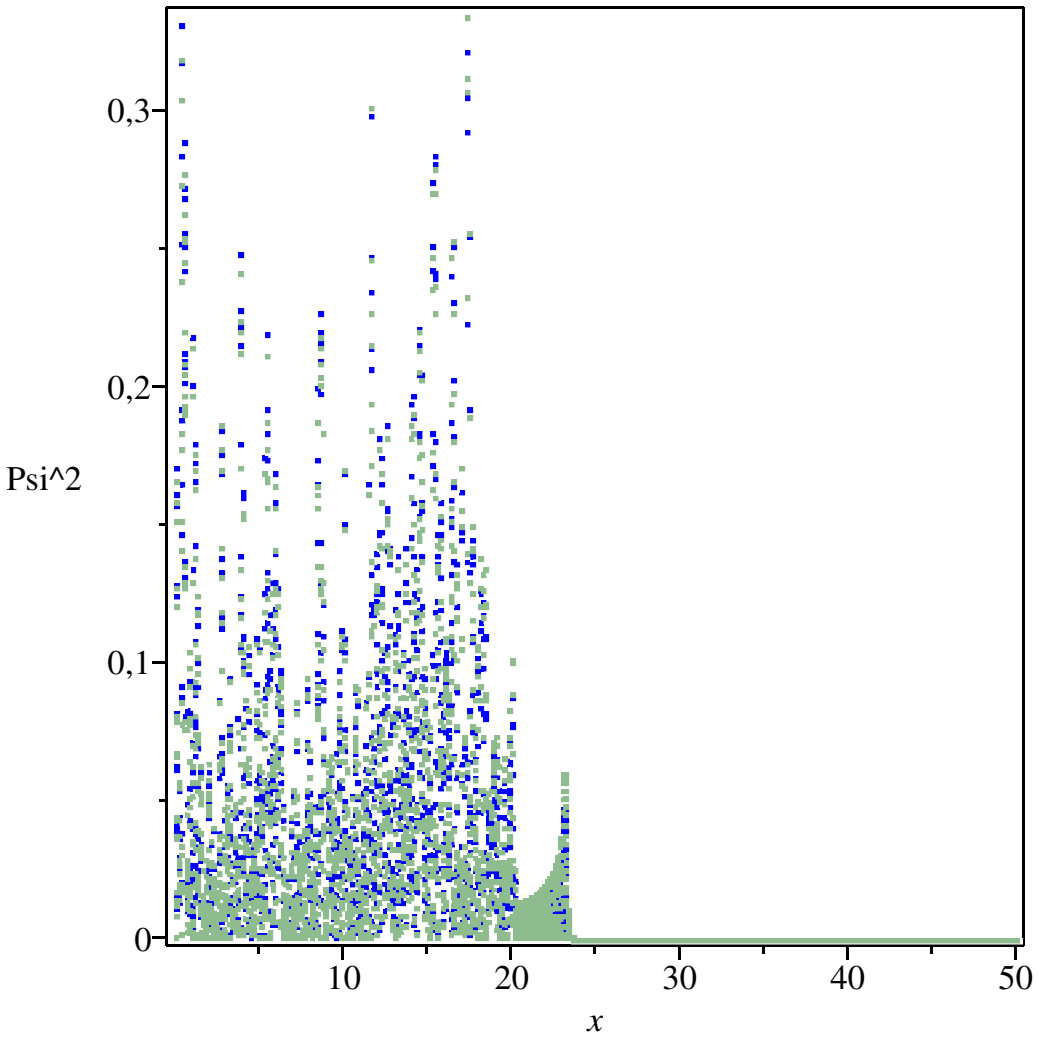
```
> macro(skyblue = COLOR(RGB, .1960, .6000, .8000)):
> macro(palegreen=RGB(.5607, .7372, .5607)):
> w2:=pointplot(aux2,style=point,axes=box,symbol=point,color=
  skyblue,labels=[t,"<a>(t)"],title=`Valor médio`):
> display([w1,w2]);
```



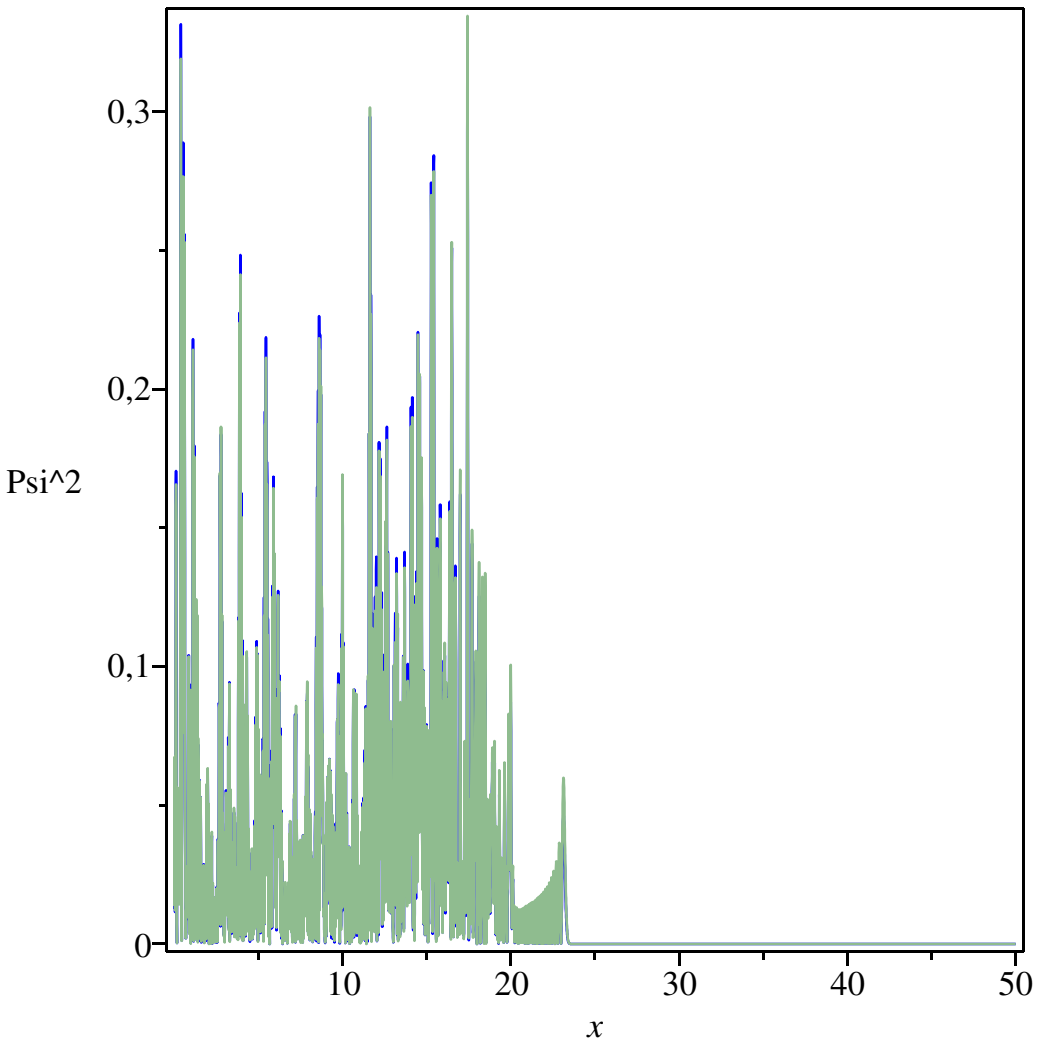

```
> w1b:=pointplot(aux1,style=line,axes=box,symbol=point,color=
  blue,labels=[t,"<a>(t)"]):
> w2b:=pointplot(aux2,style=line,axes=box,symbol=point,color=
  skyblue,labels=[t,"<a>(t)"],title=`Valor médio`):
> display([w1b,w2b]);
```




```
> w3:=pointplot(aux3,style=point,axes=box,symbol=point,color=
  blue,labels=[x,"Psi^2"]):
> w4:=pointplot(aux4,style=point,axes=box,symbol=point,color=
  palegreen,labels=[x,"Psi^2"]):
> display([w3,w4]);
```



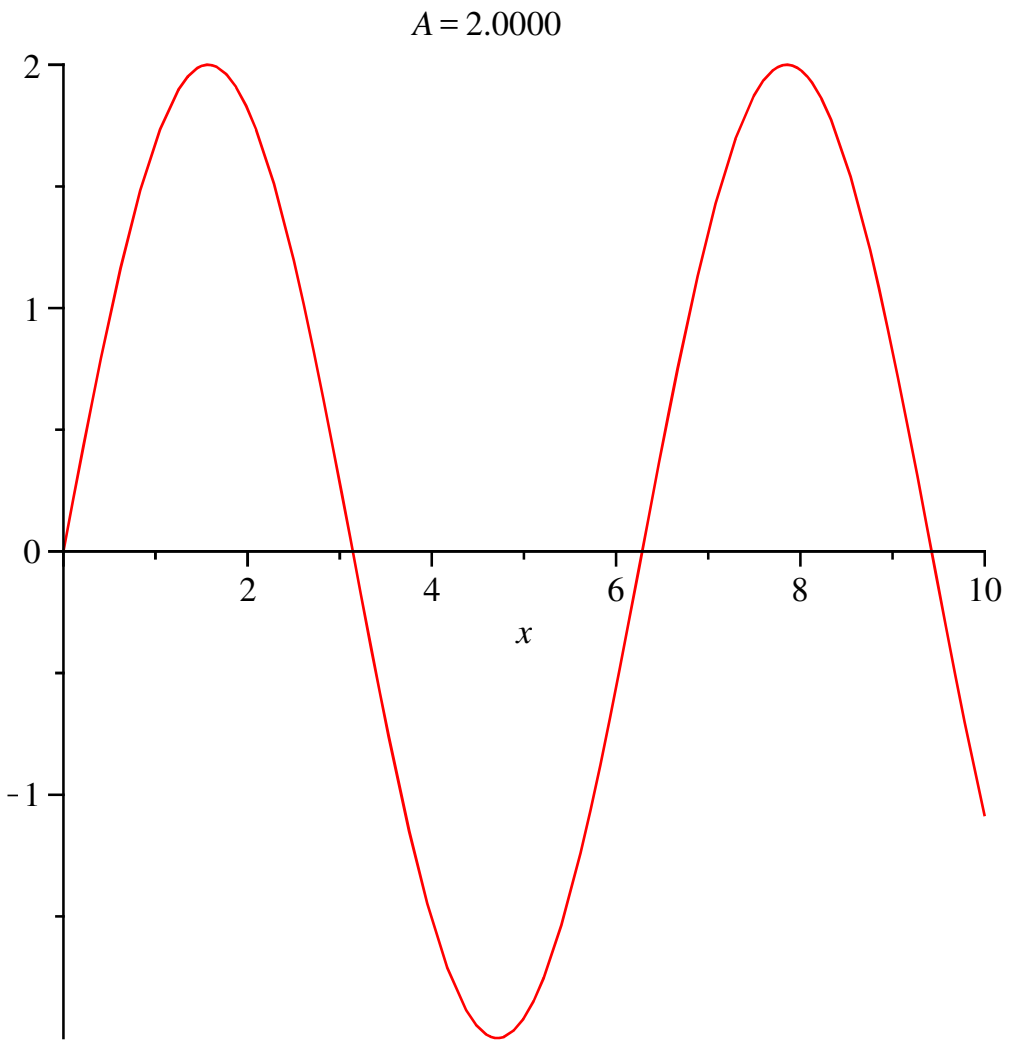

```
> w3b:=pointplot(aux3,style=line,axes=box,symbol=point,color=
  blue,labels=[x,"Psi^2"]):
> w4b:=pointplot(aux4,style=line,axes=box,symbol=point,color=
  palegreen,labels=[x,"Psi^2"]):
> display([w3b,w4b]);
```



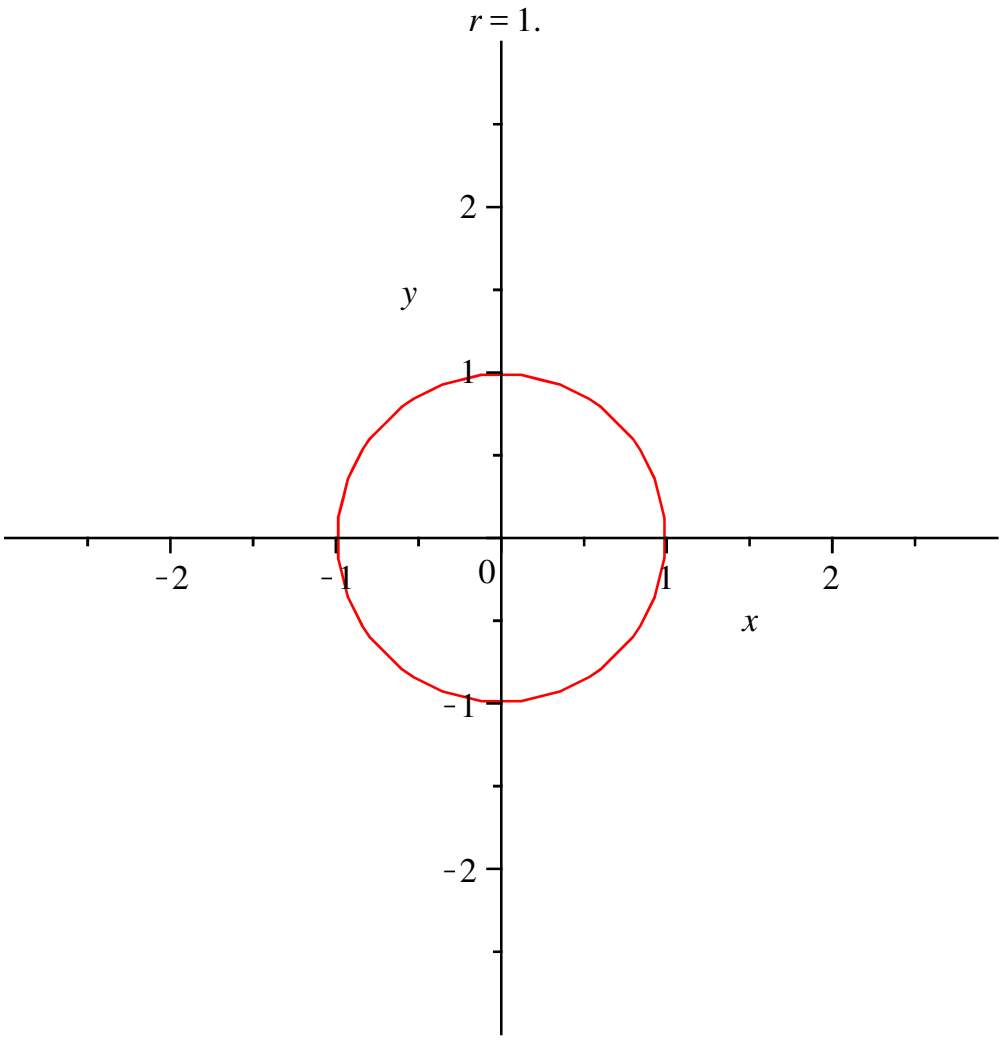
4.2. Animações

```
> ?animated
```

```
> animate( plot, [A*sin(x), x=0..10], A=0..2 );
```



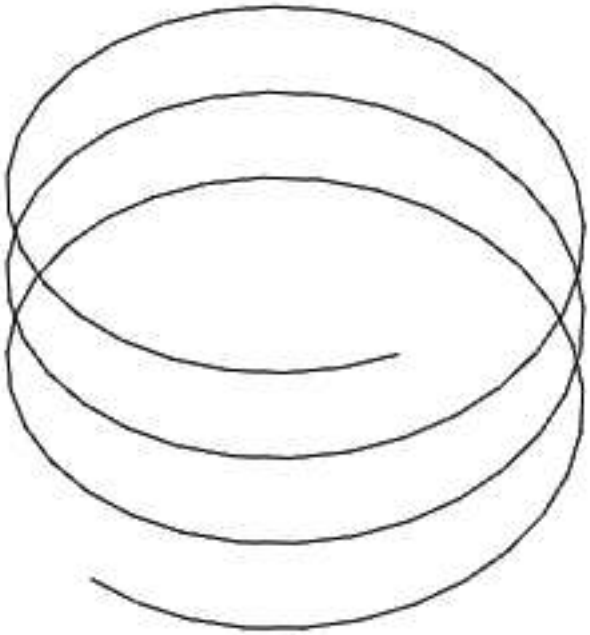

```
> animate(implicitplot, [x^2+y^2 = r^2, x = -3 .. 3, y = -3 ..
  3], r = 1 .. 3, scaling = constrained);
```



Usando o comando "thickness" você pode definir a espessura da linha.

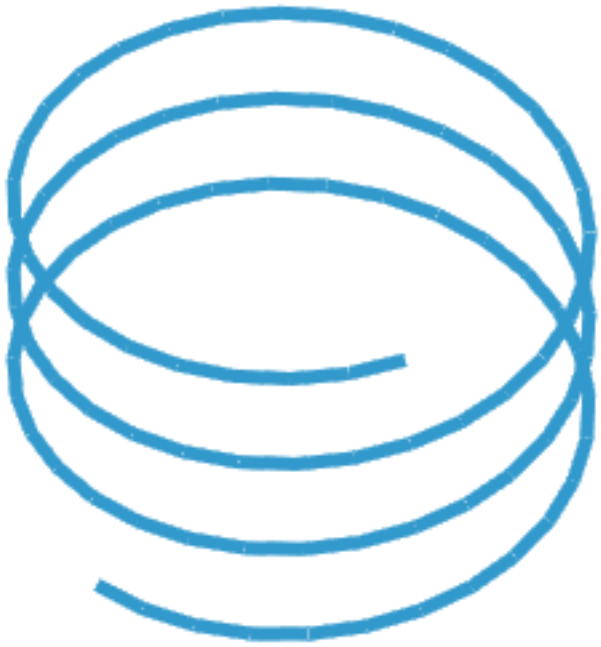
```
> opts := thickness = 1, numpoints = 100, color = black:
> opts2 := thickness =5, numpoints = 100, color = skyblue:
> animate(spacecurve, [[cos(t), sin(t), (2+sin(A))*t], t = 0 ..
  20, opts], A = 0 .. 2*Pi);
```

$A = 0.$



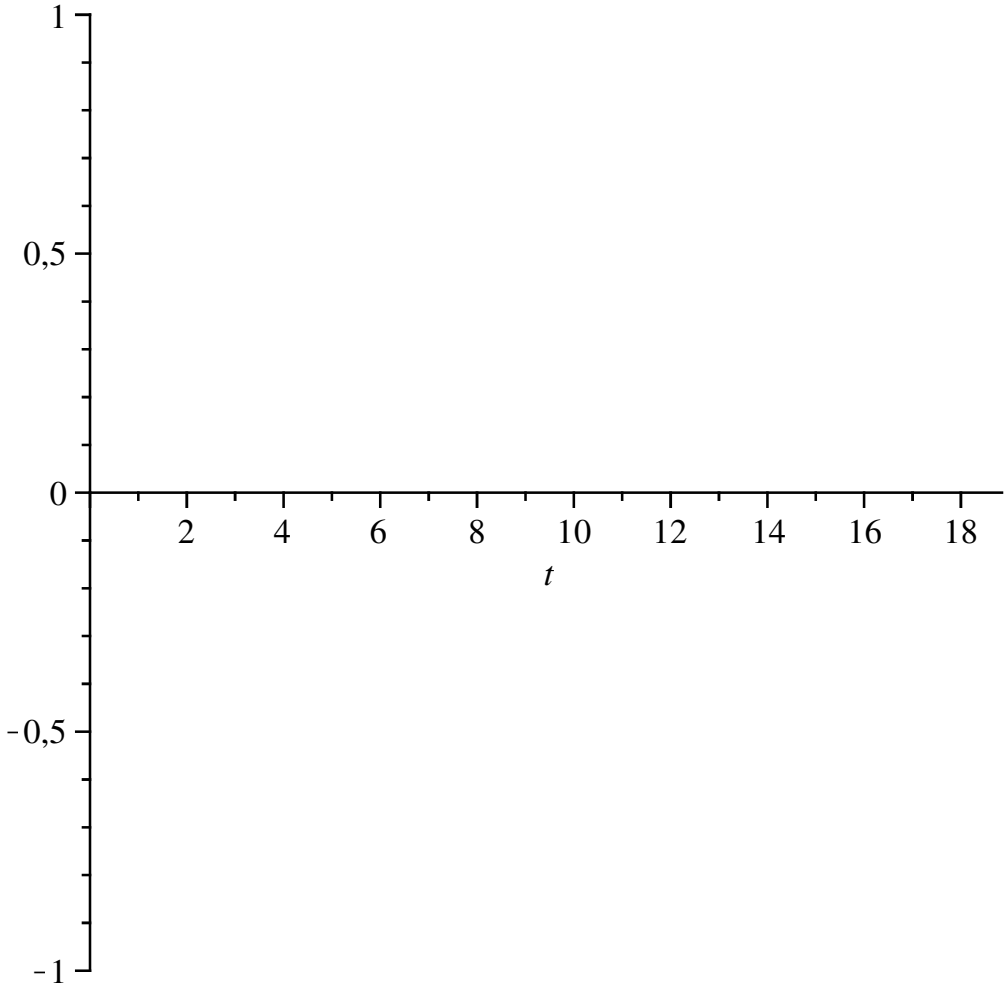
```
> animate(spacecurve, [[cos(t), sin(t), (2+sin(A))*t], t = 0 ..
  20, opts2], A = 0 .. 2*Pi);
```

$$A = 0.$$



```
> animate(plot, [[sin(t), sin(t)*exp(-(1/5)*t)], t = 0 .. x], x
  = 0 .. 6*Pi, frames = 50);
```

$x = 0.$

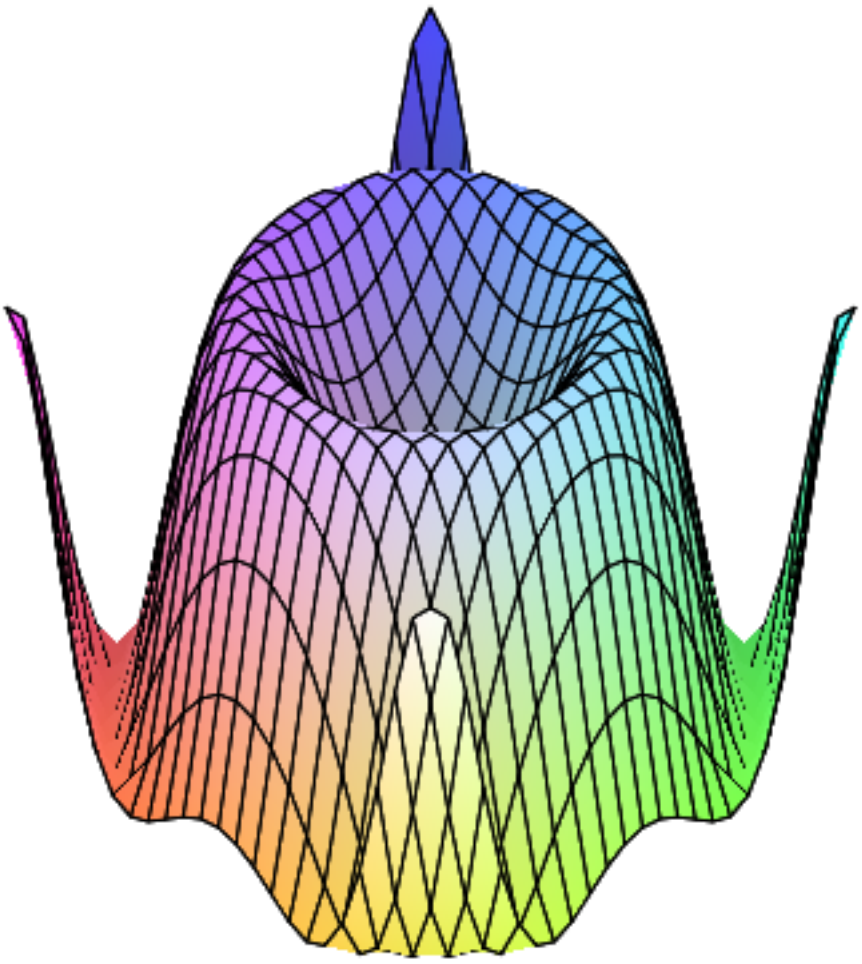


4.3. Gráfico de funções de variáveis

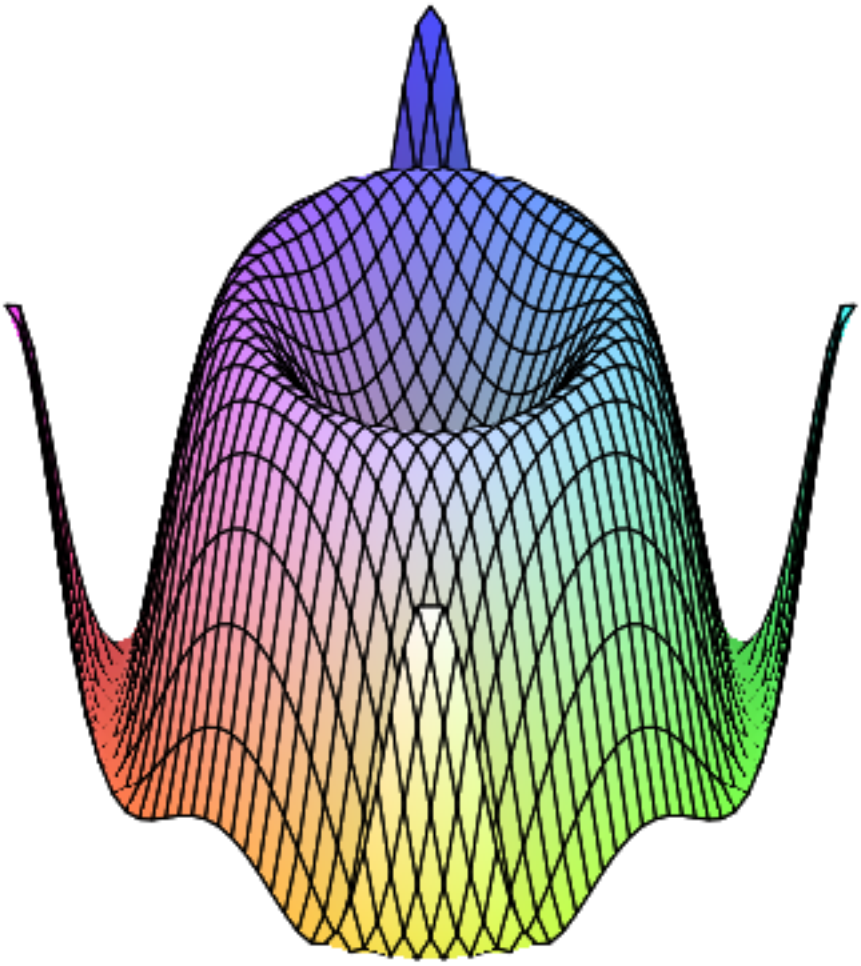
```
> m:=sin(x^2+y^2);
```

$$m := \sin\left(x^2 + y^2\right) \tag{4.6}$$

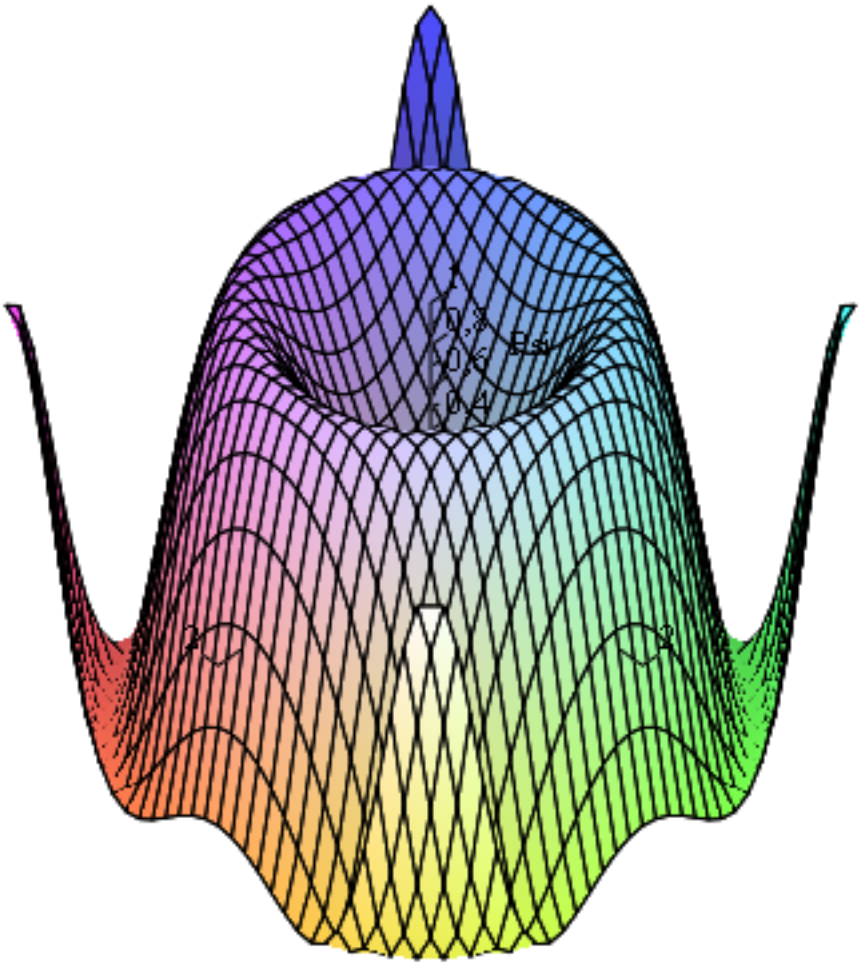
```
> plot3d(m,x=-2..2,y=-2..2);
```



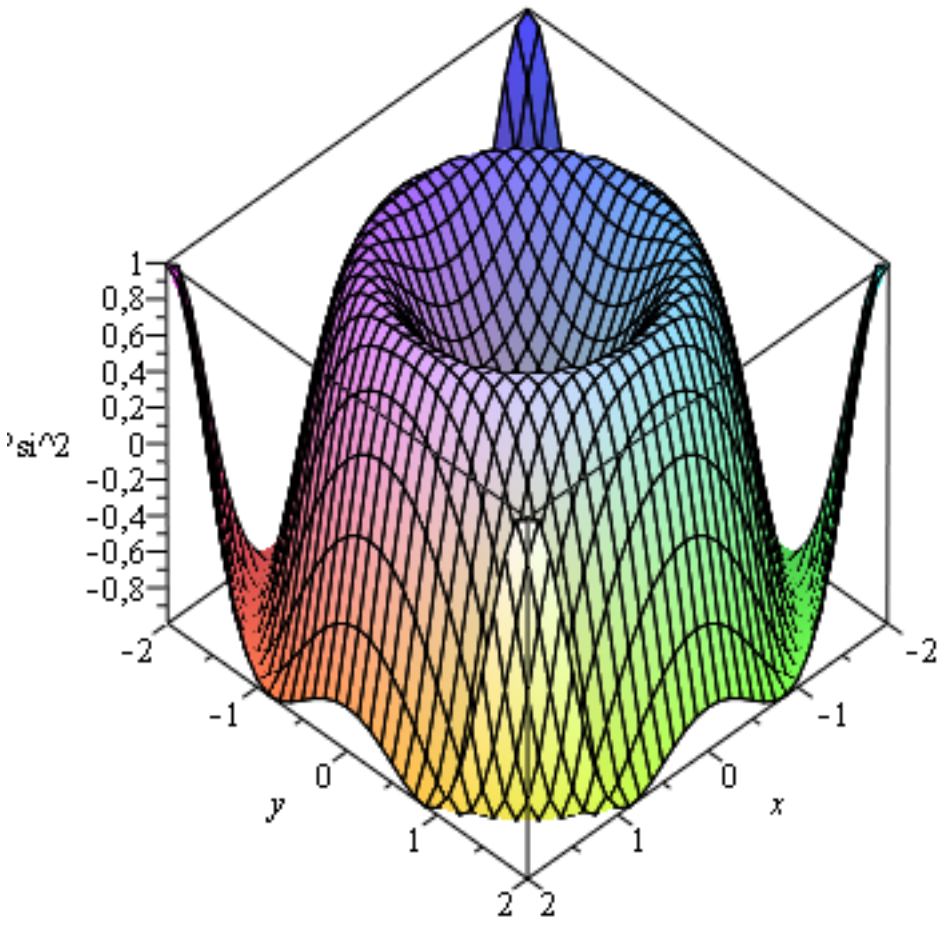
```
> plot3d(m,x=-2..2,y=-2..2,numpoints=1000);
```



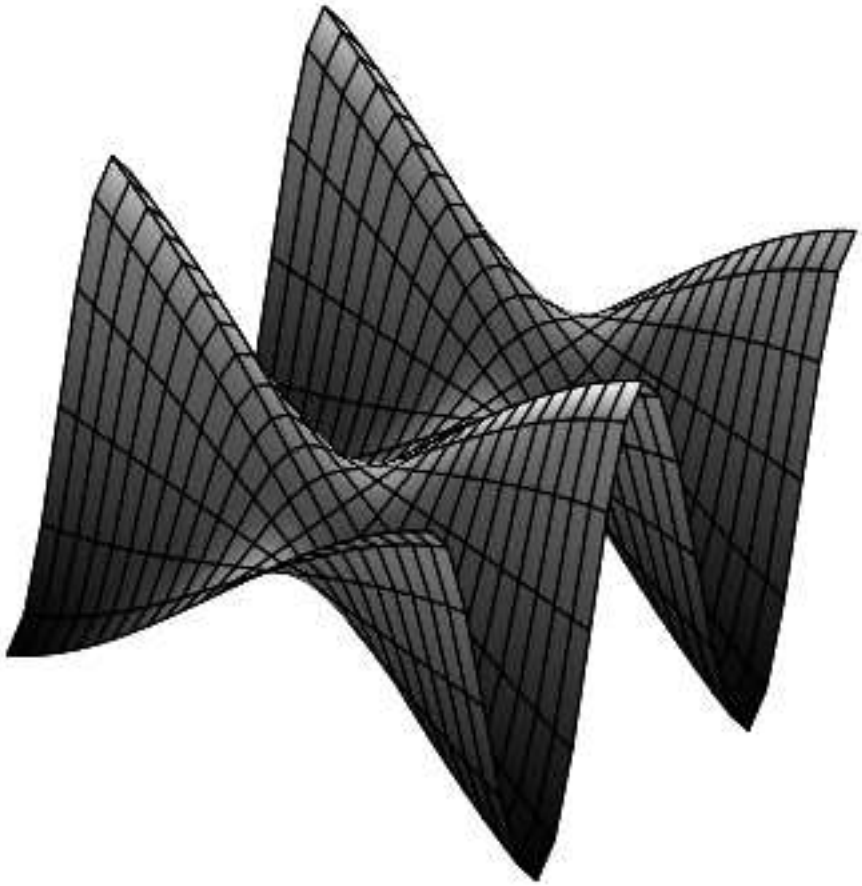
```
> plot3d(m,x=-2..2,y=-2..2,labels=[x,y,"Psi^2"],axes=normal,
  numpoints=1000);
```




```
> plot3d(m,x=-2..2,y=-2..2,labels=[x,y,"Psi^2"],axes=box,
  numpoints=1000);
```



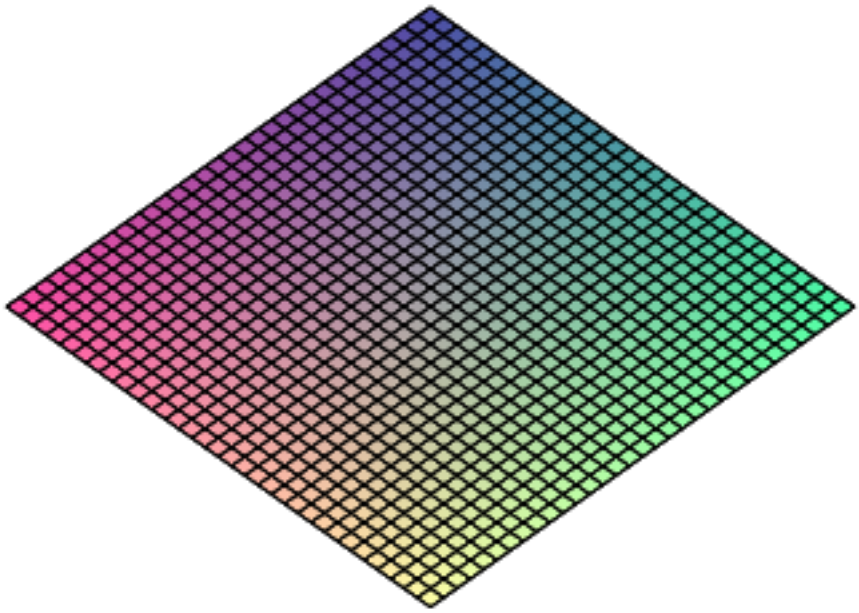

```
> plot3d(cos(x)*sin(y), x = -2*Pi .. 2*Pi, y = -1 .. 1, shading
  = zgrayscale, lightmodel = light2);
```



```
> m;
```

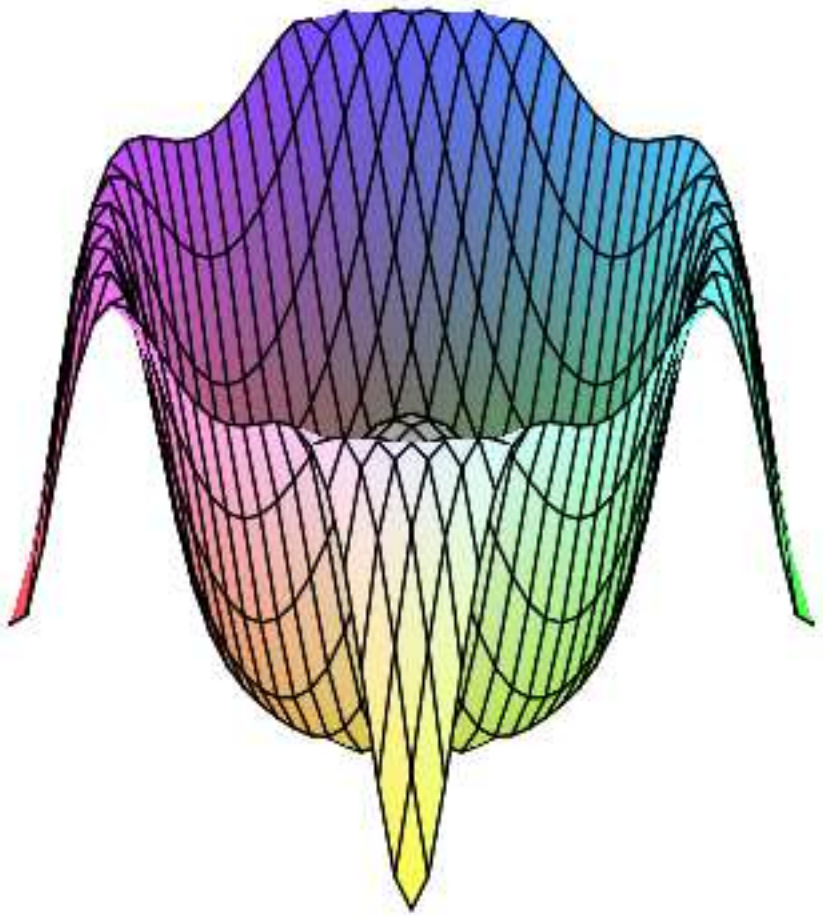
$$\sin\left(x^2+y^2\right) \tag{4.7}$$

```
> animate3d(t*m,x = -2 .. 2, y = -2 .. 2, t =0 .. 15,numpoints=
  1000,frames=50);
```

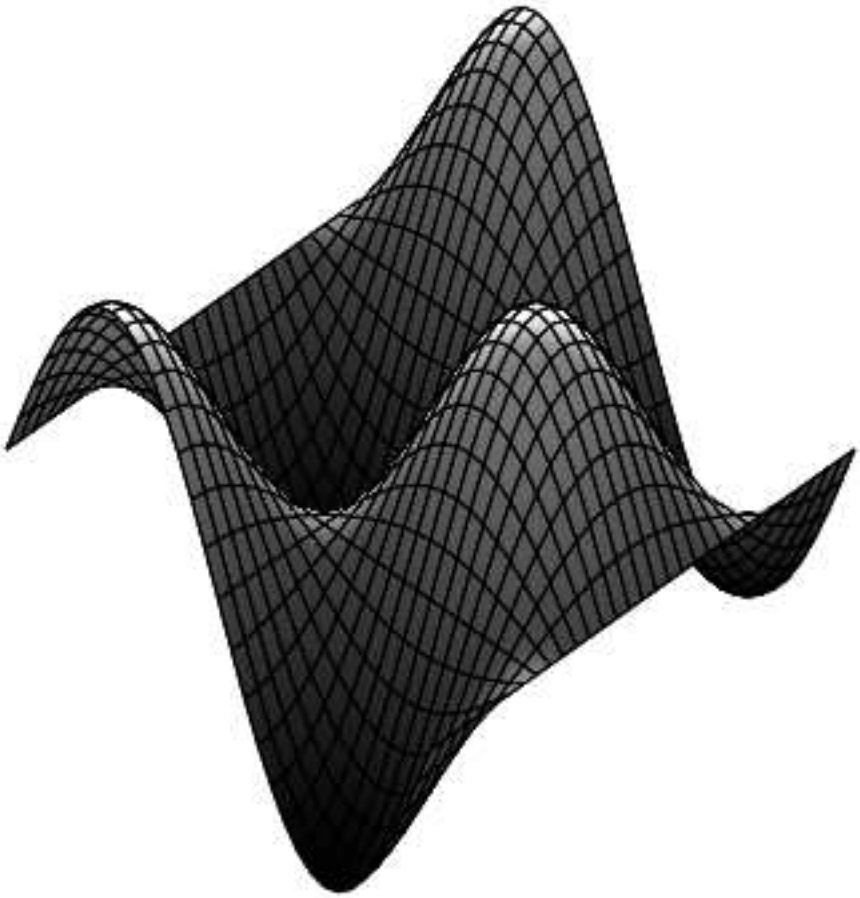


```
> animate(plot3d, [t*m, x = -2 .. 2,y=-2..2], t = -3 .. 3,
  numpoints=1000, trace = 5, frames = 50);
```

$t = -3.$

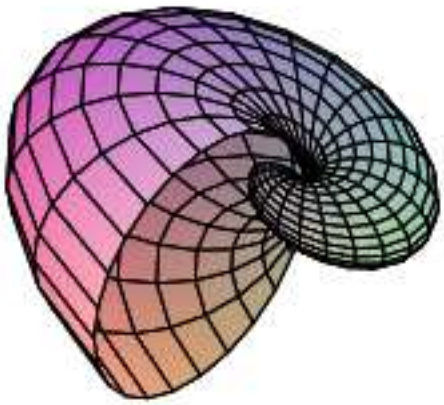


```
> animate3d(cos(t*x)*sin(t*y), x = -Pi .. Pi, y = -Pi .. Pi, t
  = 1 .. 2,numpoints=1000, shading = zgrayscale, lightmodel =
  light2);
```

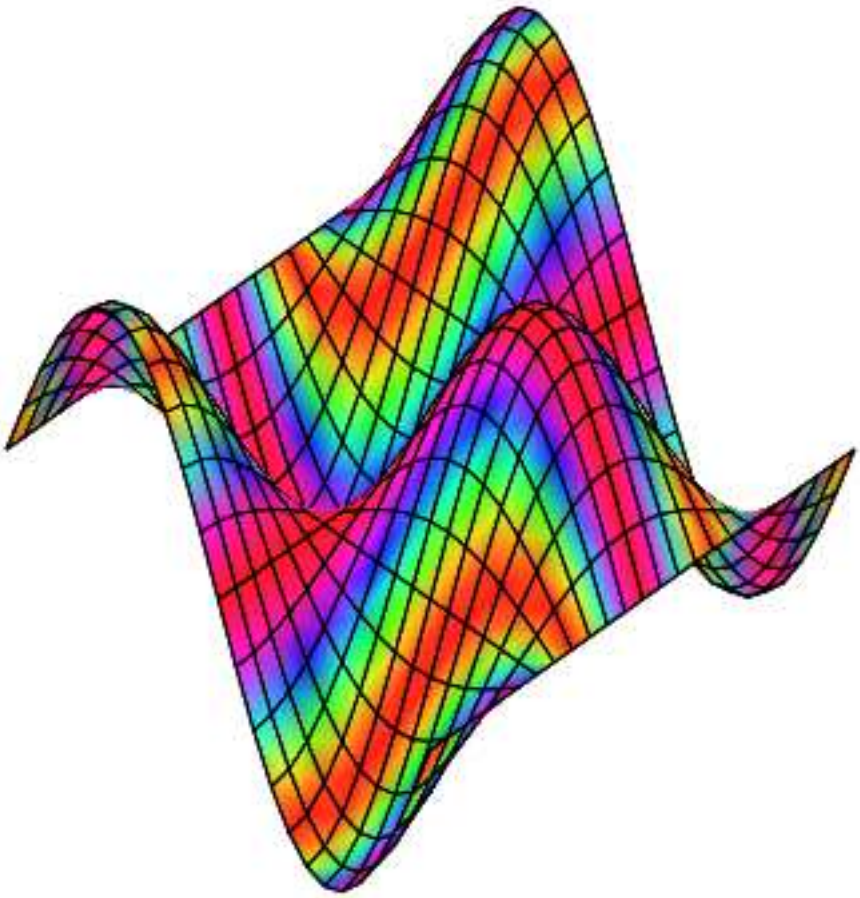


```
> animate3d(x*cos(t*u), x = 1 .. 3, t = 1 .. 4, u = 2 .. 4,
  coords = spherical);
```

```
> animate3d(1.3^x*sin(u*y), x = -1 .. 2*Pi, y = 0 .. Pi, u = 1
  .. 8, coords = spherical);
```



```
> animate3d(cos(t*x)*sin(t*y), x = -Pi .. Pi, y = -Pi .. Pi, t
  = 1 .. 2, color = cos(x*y));
```



Mais opções

```
> ?plot
```

V. Limites, Derivadas e Integrais

O ferramental do cálculo diferencial e integral faz parte também das rotinas já implementadas ao Maple.

5.1. Limites

```
> Limit(F(x),x=0);
```

$$\lim_{x \to 0} F(x) \tag{5.1}$$

```
> limit(sin(x)/x,x=0);
```

$$1 \tag{5.2}$$

```
> limit(1/x,x=0);
```

$$\mathit{undefined} \tag{5.3}$$

Nesse caso vemos que o limite de 1/x, quando x->0 não existe! Mas e seus limites laterais?

```
> Limit(1/x,x=0,right);
```

$$\lim_{x \to 0^+} \frac{1}{x} \tag{5.4}$$

```
> limit(1/x,x=0,right);
```

$$\infty \tag{5.5}$$

```
> Limit(1/x,x=0,left);
```

$$\lim_{x \to 0^-} \frac{1}{x} \tag{5.6}$$

```
> limit(1/x,x=0,left);
```

$$-\infty \tag{5.7}$$

```
> j:=((x+c)/(x-c))^x;
```

$$j := \left(\frac{x+c}{x-c} \right)^x \tag{5.8}$$

```
> limit(j,x=infinity);
```

$$e^{2c} \tag{5.9}$$

5.2. Derivada

```
> diff(F(x),x);
```

$$\frac{d}{dx} F(x) \tag{5.10}$$

```
> diff(sin(x),x);
```

$$\cos(x) \tag{5.11}$$

```
> diff(sin(x^2),x$6);
```

$$-64 \sin(x^2)\, x^6 + 480 \cos(x^2)\, x^4 + 720 \sin(x^2)\, x^2 - 120 \cos(x^2) \tag{5.12}$$

E quando a função for de duas variáveis?

```
> g:=F(x,y);
```

$$g := F(x, y) \tag{5.13}$$

```
> diff(g,x);
```

$$\frac{\partial}{\partial x} F(x, y) \tag{5.14}$$

```
> diff(tan(y/x),x);
```

$$-\frac{\left(1 + \tan\left(\frac{y}{x}\right)^2\right) y}{x^2} \tag{5.15}$$

```
> diff(tan(y/x),y);
```

$$\frac{1 + \tan\left(\frac{y}{x}\right)^2}{x} \tag{5.16}$$

5.3. Aplicações à Gráficos

Podemos ilustrar o uso destas ferramentas na construção do gráfico de uma função. Por simplicidade consideraremos uma função de uma variável.

```
> f:=1/3*x^3-6/2*x^2+5*x-7/3;
```

$$f := \frac{1}{3} x^3 - 3 x^2 + 5 x - \frac{7}{3} \quad \textbf{(5.17)}$$

Trata-se de um polinômio. Logo, o domínio de f são os reais. Onde que a curva corta o eixo y?

```
> y0:=subs(x=0,f);
```

$$y0 := -\frac{7}{3} \quad \textbf{(5.18)}$$

```
>
```

Onde a curva corta o eixo x?

```
> raizes:=[solve(f=0,x)];
```

$$raizes := [7, 1, 1] \quad \textbf{(5.19)}$$

Checando os resultados.

```
> P1:=(op(1,raizes),subs(x=op(1,raizes),f));
```

$$P1 := 7, 0 \quad \textbf{(5.20)}$$

```
> P2:=(op(2,raizes),subs(x=op(2,raizes),f));
```

$$P2 := 1, 0 \quad \textbf{(5.21)}$$

Determinando os intervalos de crescimento e decrescimento da função

```
> f1:=diff(f,x);
```

$$f1 := x^2 - 6 x + 5 \quad \textbf{(5.22)}$$

```
> solve(f1>0,x);
```

$$RealRange(-\infty, Open(1)), RealRange(Open(5), \infty) \quad \textbf{(5.23)}$$

```
>
```

Vemos então que f é crescente no intervalo aberto de]- infinito,1[U]5,infinito[. Consequentemente é decrescente no intervalo]1,5[. O sinal da concavidade da curva será dada pela derivada a segunda.

```
> f2:=diff(f1,x);
```

$$f2 := 2 x - 6 \quad \textbf{(5.24)}$$

```
> solve(f2>0,x);
```

$$RealRange(Open(3), \infty) \quad \textbf{(5.25)}$$

Pontos de Mínimo, Máximo e Inflexão

```
> pontos:=[solve(f1=0,x)];
```

$$pontos := [5, 1] \quad \textbf{(5.26)}$$

```
> minimo:=subs(x=op(1,pontos),f2);
```

$$minimo := 4 \quad \textbf{(5.27)}$$

```
> ponto_minimo:=[op(1,pontos),evalf(subs(x=op(1,pontos),f))];
```

$$ponto\_minimo := [5, -10.66666667] \quad (5.28)$$

```
> maximo:=subs(x=op(2,pontos),f2);
```

$$maximo := -4 \quad (5.29)$$

```
> ponto_maximo:=[op(2,pontos),evalf(subs(x=op(2,pontos),f))];
```

$$ponto\_maximo := [1, 0.] \quad (5.30)$$

```
> inflexao:=solve(f2=0,x);
```

$$inflexao := 3 \quad (5.31)$$

```
> ponto_inflexao:=[inflexao,evalf(subs(x=inflexao,f))];
```

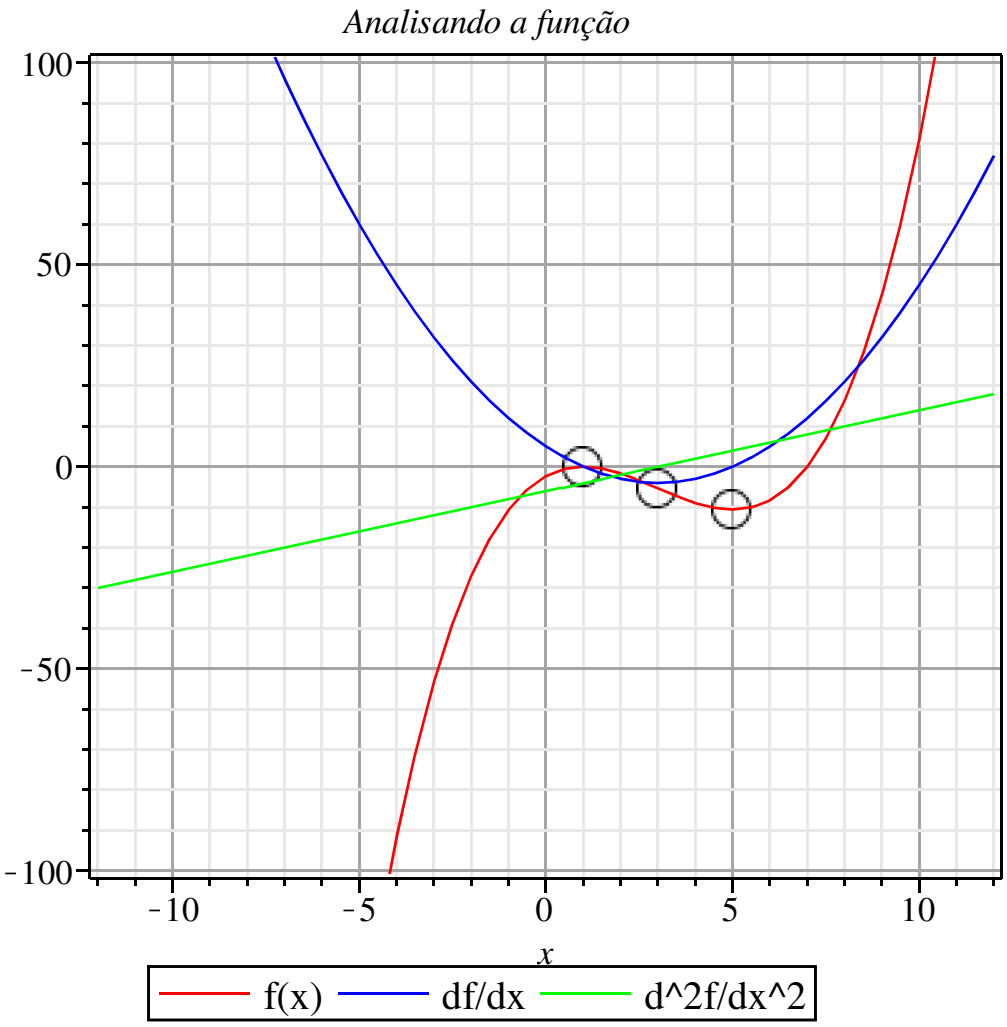
$$ponto\_inflexao := [3, -5.333333333] \quad (5.32)$$

Resumindo

```
> ponto_minimo;evalf(ponto_maximo);evalf(ponto_inflexao);
```

$$[5, -10.66666667]$$
$$[1., 0.]$$
$$[3., -5.333333333] \quad (5.33)$$

```
> macro(skyblue = COLOR(RGB, .1960, .6000, .8000)):
> graf1:=pointplot([ponto_minimo,ponto_maximo,ponto_inflexao],
  gridlines = true,style=point,symbol = circle,symbolsize=30,
  axes=box,color=black,labels=[x,""]):
> graf2:=plot([f,f1,f2],x=-12..12,-100..100,gridlines = true,
  color=[red,blue,green],labels=[x,"y(x)"],legend = ["f(x)",
  "df/dx","d^2f/dx^2"],title=`Analisando a função`):
> display([graf1,graf2]);
```



5.5. Integrais

Pode ser entendido como o processo inverso da derivada.

Integrais indefinidas

```
> Int(F(x),x);
```

$$\int F(x)\,dx \tag{5.34}$$

Integrais definidas

```
> Int(F(x),x=a..b);
```

$$\int_a^b F(x)\,dx \tag{5.35}$$

Algumas Referências

[1] http://deeke.org/prog_maple.pdf

[2] http://www.edipucrs.com.br/erematsul/minicursos/explorandorecursos.pdf