Séries de Taylor
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Tarefa 001

Realizando pequenas expressões

$$\frac{1}{3} - \frac{1}{7 \cdot 6}$$

$$\frac{13}{42} \quad \textbf{(1)}$$

Definindo uma função

$fx := \sin(x \cdot x)$

$$\sin(x^2) \quad \textbf{(2)}$$

Aplicando diferencial sobre fx

$diff(fx, x)$

$$2\,x\cos(x^2) \quad \textbf{(3)}$$

Encontrar a série de polinômios, centrado em zero, com exponencial menor ou igual a 12.

$fs := series(fx, x = 0, 12)$

$$x^2 - \frac{1}{6}\,x^6 + \frac{1}{120}\,x^{10} + O(x^{14}) \quad \textbf{(4)}$$

Convertendo a Série fs em polinômio P

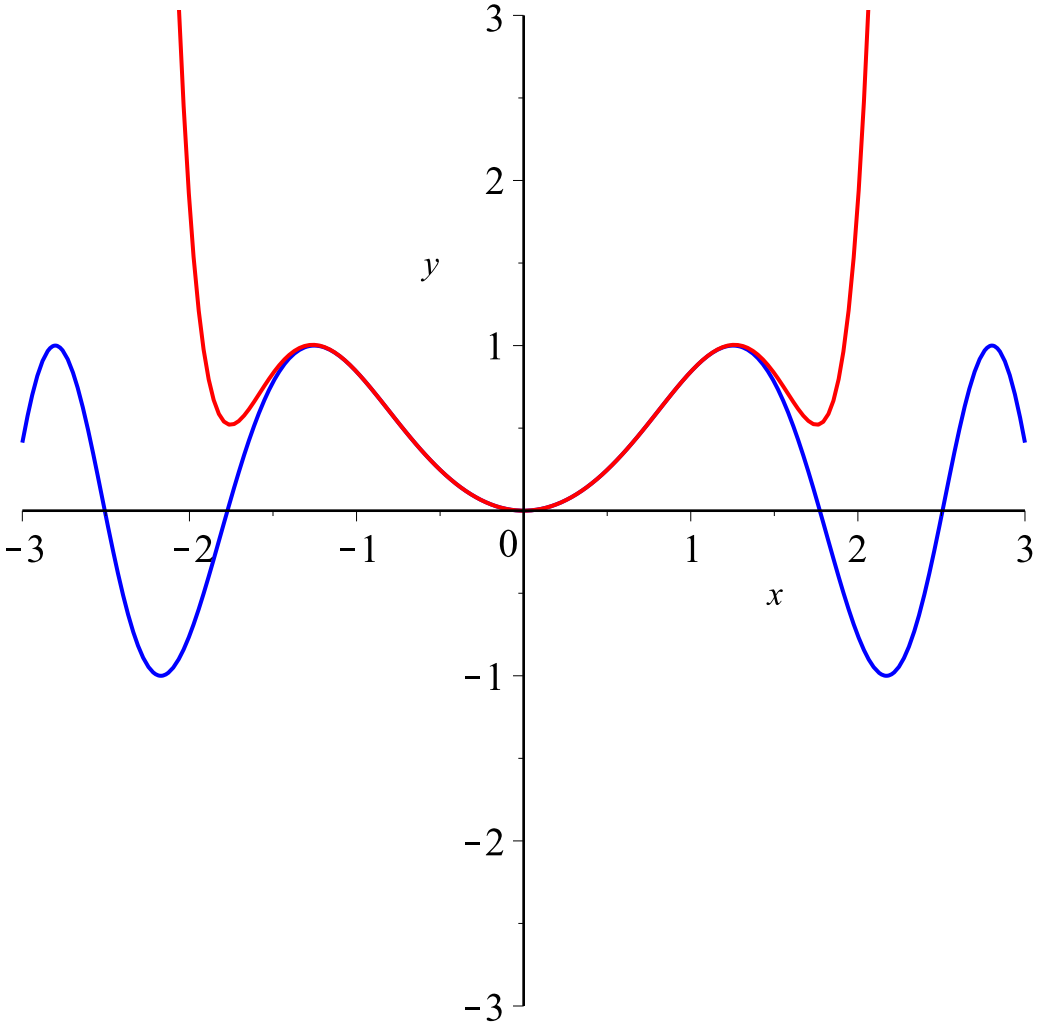
$P12 := convert(fs, polynom)$

$$x^2 - \frac{1}{6}\,x^6 + \frac{1}{120}\,x^{10} \quad \textbf{(5)}$$

Utilizando a biblioteca gráfica de funções $with(plots)$

[*animate*, *animate3d*, *animatecurve*, *arrow*, *changecoords*, *complexplot*, *complexplot3d*, *conformal*, *conformal3d*, *contourplot*, *contourplot3d*, *coordplot*, *coordplot3d*, *densityplot*, *display*, *dualaxisplot*, *fieldplot*, *fieldplot3d*, *gradplot*, *gradplot3d*, *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*, *shadebetween*, *spacecurve*, *sparsematrixplot*, *surfdata*, *textplot*, *textplot3d*, *tubeplot*] **(6)**

Geramos o gráfico da função com o comando: $plot([fx, P12], x = -3..3, y = -3..3, color = [blue, red])$



Integrando de 0 *até* 1 *a função fx i1* := *int*(*fx*, $x = 0..1$)

$$\frac{1}{2}\ \mathrm{FresnelS}\left(\frac{\sqrt{2}}{\sqrt{\pi}}\right)\sqrt{2}\ \sqrt{\pi} \tag{7}$$

Sabendo que fx é aproximadamente igual a P6, podemos integrar o polinômio *i2* := *int*(*P12*, $x = 0..1$)

$$\frac{2867}{9240} \tag{8}$$

Podemos saber o erro pela diferença *erro* := *evalf* (*i1*) − *evalf* (*i2*)

$$-0.0000130840 \tag{9}$$