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Tutorial on solving 2nd order differential equations with Maxima.

(%i1) 'diff(y,x,2)+2*'diff(y,x)+4*y=0;

$$(\%o1) \frac{d^2}{dx^2}y + 2\left(\frac{d}{dx}y\right) + 4y = 0$$

(%i2) ode2(%, y, x);

$$(\%o2) y = \%e^{-x} (\%k1 \sin(\sqrt{3}x) + \%k2 \cos(\sqrt{3}x))$$

(%i3) ic2(%, x=0, y=1, 'diff(y,x)=0);

$$(\%o3) y = \%e^{-x} \left(\frac{\sqrt{3} \sin(\sqrt{3}x)}{3} + \cos(\sqrt{3}x) \right)$$

(%i4) 'diff(y,x,2)+2*'diff(y,x)+4*y=1+exp(-%pi*x);

$$(\%o4) \frac{d^2}{dx^2}y + 2\left(\frac{d}{dx}y\right) + 4y = \%e^{-\pi x} + 1$$

(%i5) ode2(%, y, x);

$$(\%o5) y = \%e^{-x} (\%k1 \sin(\sqrt{3}x) + \%k2 \cos(\sqrt{3}x)) + \frac{\%e^{-\pi x} ((\pi^2 - 2\pi + 4)\%e^{\pi x} + 4)}{4\pi^2 - 8\pi + 16}$$

(%i6) ic2(%, x=0, y=0, 'diff(y,x)=0);

$$(\%o6) y = \%e^{-x} \left(-\frac{(\pi^2 - 6\pi + 8) \sin(\sqrt{3}x)}{4\sqrt{3}\pi^2 - 8\sqrt{3}\pi + 16\sqrt{3}} - \frac{(\pi^2 - 2\pi + 8) \cos(\sqrt{3}x)}{4\pi^2 - 8\pi + 16} \right) +$$

$$\frac{\%e^{-\pi x} ((\pi^2 - 2\pi + 4)\%e^{\pi x} + 4)}{4\pi^2 - 8\pi + 16}$$

(%i7) limit(%, x, inf);

$$(\%o7) y = \frac{1}{4}$$

(%i8)