7.4) Using boundary conditions

Worked example	Your turn
Find y in terms of x, given that $\frac{d^2y}{dx^2} - y = 2e^{-x}$, and that $\frac{dy}{dx} = 0$ and $y = 0$ at $x = 0$.	Find y in terms of x, given that $\frac{d^2y}{dx^2} - y = 2e^{x}$, and that $\frac{dy}{dx} = 0$ and $y = 0$ at $x = 0$.

$$y = -\frac{1}{2}e^{x} + \frac{1}{2}e^{-x} + xe^{x}$$

Find y in terms of x, given that $\frac{d^2y}{dx^2} + 25y = 3\cos 5x$, and that $\frac{dy}{dx} = 5$ and $y = 0$ at $x = 0$.

Find x in terms of t, given that $\frac{d^2y}{dx^2} + x = 3\sin 2t$, and that $\frac{dx}{dt} = 1$ and $x = 0$ at $t = 0$.

$$x = 3\sin t - \sin 2t$$

Worked example	Your turn
Solve the differential equation $$\frac{d^2y}{dx^2} + 16y = \sin 4x$$ subject to boundary conditions $y = 0, \frac{dy}{dx} = 0$ when $x = 0$	Solve the differential equation $$\frac{d^2y}{dx^2} + 9y = \sin 3x$$ subject to boundary conditions $y = 0, \frac{dy}{dx} = 0$ when $x = 0$ $$y = \frac{1}{18}\sin 3x - \frac{1}{6}x\cos 3x$$