Boundary Conditions

Example

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 $x = 0$.

Test Your Understanding

1.

(a) Find the value of λ for which $y = \lambda x \sin 5x$ is a particular integral of the differential equation **(4 marks)**

$$\frac{d^2y}{dx^2} + 25y = 3\cos 5x$$

(b) Using your answer to part (a), find the general solution of the differential equation **(3 marks)**

$$\frac{d^2y}{dx^2} + 25y = 3\cos 5x$$

(c) Given that at $x = 0$, $y = 0$ and $\frac{dy}{dx} = 5$, find the particular solution to this differential equation, giving your solution in the form $y = f(x)$ **(5)**

(d) Sketch the curve with equation $y = f(x)$ for $0 \leq x \leq \pi$ **(2)**

2. Find the general solution of the differential equation

$$\frac{d^2x}{dt^2} + 5\frac{dx}{dt} + 6x = 2\cos t - \sin t$$

Ex7C/ D and Mixed Ex