

Exercise 11J

1 Find general solutions to the following differential equations. Give your answers in the form $y = f(x)$.

a $\frac{dy}{dx} = (1 + y)(1 - 2x)$

c $\cos^2 x \frac{dy}{dx} = y^2 \sin^2 x$

b $\frac{dy}{dx} = y \tan x$

d $\frac{dy}{dx} = 2e^{x-y}$

2 Find particular solutions to the following differential equations using the given boundary conditions.

a $\frac{dy}{dx} = \sin x \cos^2 x; y = 0, x = \frac{\pi}{3}$

c $\frac{dy}{dx} = 2 \cos^2 y \cos^2 x; y = \frac{\pi}{4}, x = 0$

b $\frac{dy}{dx} = \sec^2 x \sec^2 y; y = 0, x = \frac{\pi}{4}$

d $\sin y \cos x \frac{dy}{dx} = \frac{\cos y}{\cos x}, y = 0, x = 0$

3 a Find the general solution to the differential equation

$x^2 \frac{dy}{dx} = y + xy$, giving your answer in the form $y = g(x)$.

b Find the particular solution to the differential equation that satisfies the boundary condition $y = e^4$ at $x = -1$.

Hint

Begin by factorising the right-hand side of the equation.