

*Week 20 workshop exercises*

1. State the order of the differential equation and verify that the given function is a solution:

(a)  $\frac{dy}{dx} - 2y = 2$ ,  $y = e^{2x} - 1$ ;

(b)  $\frac{d^2 f}{dt^2} + 4f = 0$ ,  $f = a \cos(2t) + b \sin(2t)$ ;

(c)  $\frac{d^3 y}{dx^3} = 12$ ,  $y = 2x^3 + 3x^2 + 4x + 5$

2. Find the general solutions and the particular solutions for which  $y(0) = 1$ :

(a)  $\frac{dy}{dx} = \frac{3x^2}{y}$ ;      (b)  $\frac{dy}{dx} = 4xy^2$

3. Find the general solutions:

(a)  $\frac{dy}{dx} + 2y = 4$ ;      (b)  $\frac{dy}{dx} - 4xy = x$ ;      (c)  $\frac{dy}{dx} + \frac{2y}{x} = 2 \cos x$ ;      (d)  $\frac{dy}{dx} + a \frac{y}{x} = x^n$ .