

MATH2132 Test 3

Values

- 8 1. Find, in explicit form, a 1-parameter family of solutions of the differential equation

$$\frac{dy}{dx} = 2xy + x.$$

- 8 2. (a) Find a 1-parameter family of solutions of the differential equation

$$x^2 \frac{dy}{dx} - 3y = 4.$$

- (b) Can there be any singular solutions to your family of solutions in part (a)? Explain.

- 14 3. Find a general solution of the differential equation

$$3y''' + 5y'' + 4y' - 2y = 2e^x + x.$$

- 10 4. (a) A 500 gram mass is suspended from a spring with constant 50 newtons per metre. It is set into motion by releasing it from a position 10 centimetres above its equilibrium position. If a damping force proportional to velocity with coefficient $\beta = 2$ acts on the mass, find its position as a function of time.
(b) If your solution is expressed in the form $Ae^{-\beta t} \sin(\omega t + \phi)$, where A and ω are constants, what is A ?