

MATH224. Homework 2.

1. Find the general solutions to the following first-order differential equations

(i) $\frac{dy}{dx} + 2xy = 5x$

(ii) $t \frac{dz}{dt} = z + \frac{z^2}{t}$

2. Solve the following differential equations with the initial condition $y(0) = 1$.

(i) $\frac{dy}{dx} + \frac{y}{x+3} = 2x^2$

(ii) $\frac{dy}{dt} = \frac{3(y+1)}{t^2+5t+6}$

(iii) $y' - y \tan x = 4$

3. Find the general solutions to the following exact differentials

(i) $\frac{dy}{dx} = - \frac{[3x^2 \cos(x^3 + y^2) + 1]}{2y \cos(x^3 + y^2)}$

(ii) $\frac{dy}{dx} = \frac{[2xe^{-x^2} - \frac{e^y}{x}]}{e^y \ln x}$

4. [Revision from last year.] Solve these second order differential equations with the initial conditions $y(0) = 1$, $y'(0) = 0$.

(i) $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 8y = 0$

(ii) $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 9y = 0$