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SIT 294 : Engineering Maths

Semester 1, 2007

Solutions to Exam

$$1(a) \quad (1+x^2)y' = 1-2xy \Rightarrow \frac{dy}{dx} + \frac{2x}{1+x^2}y = \frac{1}{1+x^2}$$

$$\mu = e^{\int \frac{2x}{1+x^2} dx} = e^{\ln(1+x^2)} = 1+x^2 \quad 2$$

$$\therefore \frac{d}{dx} \{ y(1+x^2) \} = 1 \quad 1$$

$$\Rightarrow y = \frac{1}{1+x^2} \int 1 dx = \frac{1}{1+x^2} \{ x + c \} \quad 2$$

i.e. $y = \frac{x+c}{1+x^2}$ 1

$$y(2) = 1 \Rightarrow 2 = \frac{1+c}{2} \Rightarrow c = 3 \quad 1$$

$$\therefore \text{Solution of I.V.P. is } y = \frac{x+3}{1+x^2} \quad \frac{1}{8}$$

$$1(b). \quad x(1+2y)y' = 1+x^2 \Rightarrow (1+2y)dy = \left(\frac{1}{x} + x \right) dx \quad 2$$

$x \neq 0$

Integrating \Rightarrow