

MAP 2302 Differential Equations, Homework 9 & Answers

$$1: y'' - 3y' + 2y = x^2 e^x \text{ Ans: } y = y_c + y_p = \underbrace{c_1 e^x + c_2 e^{2x}}_{y_c} + \underbrace{\left(-2x - x^2 - \frac{1}{3}x^3\right) e^x}_{y_p}$$

$$2: 4y''' - 4y'' - 5y' + 3y = 3x^3 - 8x \text{ Ans: } y = y_c + y_p = \underbrace{c_1 e^{-x} + c_2 e^{\frac{3}{2}x} + c_3 e^{\frac{1}{2}x}}_{y_c} + \underbrace{(42 + 22x + 5x^2 + x^3)}_{y_p}$$

$$3: y'' - y = 3x^2 e^x; y(0) = 1, y'(0) = 2. \text{ Ans: } y = y_c + y_p = \underbrace{\frac{9}{8}e^x - \frac{1}{8}e^{-x}}_{y_c} + \underbrace{\left(\frac{3}{4}x - \frac{3}{4}x^2 + \frac{1}{2}x^3\right) e^x}_{y_p}$$

$$4: y''' - y' = e^x \text{ Ans: } y = y_c + y_p = \underbrace{c_1 + c_2 e^x + c_3 e^{-x}}_{y_c} + \underbrace{\frac{1}{2}x e^x}_{y_p}$$

$$5: y^{(4)} - 2y^{(2)} + y = e^x \text{ Ans: } y = y_c + y_p = \underbrace{c_1 e^x + c_2 e^{-x} + c_3 x e^x + c_4 x e^{-x}}_{y_c} + \underbrace{\frac{1}{8}x^2 e^x}_{y_p}$$

$$6: y'' - 2y' - 3y = 2e^x - 10 \sin x \text{ Ans: } y = y_c + y_p = \underbrace{c_1 e^{3x} + c_2 e^{-x}}_{y_c} + \underbrace{\left(-\frac{1}{2}e^x - \cos x + 2 \sin x\right)}_{y_p}$$