

**Exam Two, MTH 205, Summer 2010**

Ayman Badawi

**QUESTION 1. (16 points)** Solve for  $y(x)$ , and use the undetermined coefficient method to find  $y_p(x)$  :

$$y^{(5)} - 4y^{(3)} = 2x + 10$$

**QUESTION 2. (16 points)** Solve for  $y(x)$ , and use the undetermined coefficient method to find  $y_p(x)$  :

$$y^{(2)} - 2y' + y = 12 + e^{-x}$$

---

**QUESTION 3. (16 points)** Solve for  $y(x)$ :  $y^{(2)} + y = 4\sec(x)$  [Note that  $\sin(x)^2 + \cos(x)^2 = 1$  and  $\sec(x) = 1/\cos(x)$ ]

**QUESTION 4. (20 points)** Solve for  $y(x)$ :  $y^{(2)} + \frac{1}{x}y' = \frac{1}{x^2}$

**QUESTION 5. (16 points)** An object weighing 8 pounds stretches a spring 6 inches. At  $t = 0$ , the object is released from a point 8 inches above the equilibrium position with a downward velocity  $4/3$  ft/sec.

a) Find the equation of the motion,  $x(t)$ .

b) At what time does the object pass through the equilibrium position for the second time coming from above the equilibrium position?

**QUESTION 6. (16 points)** Solve for  $x(t), y(t)$ :

$$x'(t) - \int_0^t y(r) dr = 0$$

$$x^{(2)}(t) - y'(t) = 0, x(0) = 1, x'(0) = 0, y(0) = 1$$

**Faculty information**

Ayman Badawi, Department of Mathematics & Statistics, American University of Sharjah, P.O. Box 26666, Sharjah, United Arab Emirates.

E-mail: [abadawi@aus.edu](mailto:abadawi@aus.edu), [www.ayman-badawi.com](http://www.ayman-badawi.com)