**AUB - Math department**
Prof. H. Gebran

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**MATH 202** **Sample of Quiz II** April 30, 2007

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**Material:** Sections 4.1, 4.2, 4.3, 4.4, 4.6, 4.7, 7.1, 7.2, 7.3, 7.4.

**Duration: 1h.30**

**Exercise 1.** (*15 points*)

Find the general solution of $y'' - y' - 2y = 5x^2$.

*Hint. Find a particular solution which is a polynomial.*

**Exercise 2.** (*15 points*)

Solve the differential equation $y'' + 2y' - 3y = \sin(2x)$.

**Exercise 3.** (*10 points*)

Find the general solution of

$$x^2y'' + xy' - y = 0 \quad \text{for } x > 0.$$

**Exercise 4.** (*15 points*)

Use the variation of parameters method to solve the equation

$$y'' - 2y' + y = \frac{e^x}{x} \quad \text{for } x > 0.$$

**Exercise 5.** (*25 points*)

a) Find a function whose Laplace transform is $\dfrac{1}{(s^2+4)^2}$.

b) Solve the initial value problem

$$\begin{aligned} y'' + 4y &= \sin(2t) \\ y(0) = 0, &\, y'(0) = 1. \end{aligned}$$

Do you see any physical meaning of this problem?

c) (*Bonus*) Find a function whose Laplace transform is $\dfrac{1}{(s^2+4)^3}$.

**Exercise 6.** (*20 points*)

Solve by two different methods the initial value problem

$$\begin{aligned} y'' - y' + y &= e^{-t} \\ y(0) = y'(0) &= 0. \end{aligned}$$