Name _____

Prince of Songkla University

Faculty of Engineering

Midterm Test	Semester 1/2014
16 October 2014	9:00-12:00
215-613 Mathematical Methods in Engineering	Room R200

Direction:

1. All types of calculators, document and books are permitted.

2. There are totally 5 problems. Solve all of them.

Total 70 points

Problem #	Full Score	Your mark
1	10	
2	15	
3	10	
4	15	
5	20	
Total	**70**	

Perapong Tekasakul

Instructor

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Total 70 points

1. (a) Describe the difference between partial and ordinary differential equation, and give examples. (4 points)

   (b) Describe differences between *linear* and *non-linear*, *homogeneous* and *nonhomogeneous* differential equations, and give examples. (6 points)

Name _____

2. Solve the initial value problem. (15 points)

$$2y'' + y' - 15y = 7e^{-3x}$$
$$y(0) = 0$$
$$y'(0) = 0$$

Name _____

3. What are solutions to the following ODE?

$$xy'' - 5y' + xy = 0$$

Hint: You may try $y = x^3 u$ (10 points)

Name _____

4. Solve the following problem. (15 points)

$$x^2 y'' + xy' - 4y = x$$
$$y(1) = 1$$
$$y'(1) = 0$$

5. The mass-spring-damper system is subjected to an external force and motion of the mass is described by

$$y'' + 4y' + 3y = u(t) + u(t-10)$$
$$y(0) = 0$$
$$y'(0) = 0$$

Determine the response, $y(t)$. (20 points)