Prince of Songkla University
Faculty of Engineering

Final Test
12 October 2007
215-613 Mathematical Methods in Engineering

Semester 1/2550
9:00-12:00
Room R300

Name _____ ID _____

Direction:
1. Open book exam. Everything is allowed.
2. There are total of 4 problems.

Problem	**Full score**	**Your score**
1	10	
2	10	
3	20	
4	10	
Total	50	

Perapong Tekasakul
Instructor

215-613
Mathematical Methods in Engineering

Final Test
Semester 1/2550
Total 50 points

1. Are the following functions odd, even, or neither odd or even? (10 points)
   (a) $\sin(x+\pi/2)$
   (b) $\left|\sqrt{x^{3/4}}\right|$
   (c) $\sinh(x+\pi/4)$
   (d) $\ln x^2$
   (e) $e^{|-2x|}$

2. Find the Fourier Transform of

$$f(x)=\begin{cases}|x| & \text{if } -1<x<1\\ 0 & \text{Otherwise}\end{cases}$$

   (10 points)

3. The 1-D heat conduction in a 1-m long iron rod can be described by

$$\frac{\partial T}{\partial t}=c^2\frac{\partial^2 T}{\partial x^2}$$

   where $c^2=2.0$ m^2/sec. The boundary conditions are

$$T(0,t)=100\ ^\circ\text{C}$$
$$T(10,t)=150\ ^\circ\text{C}$$

   and the initial temperature profile is $T(x,0)=100+0.5x^2\ ^\circ\text{C}$.

   Determine the temperature profile in the rod at any time t and plot the temperature profiles for some values of t. (20 points)

4. Following is a system of four linear equations with only three unknowns. Does this system have a unique solution? If you think the solution exists, solve it by Gaussian Elimination. (10 points)

$$3x_1+x_2+7x_3-2x_4=0$$
$$x_1-2x_2-8x_3+3x_4=-1$$
$$5x_1+5x_2+x_3+2x_4=3$$
$$x_1-x_2+10x_3-4x_4=1$$