



Prince of Songkla University
Faculty of Engineering

Final Test
3 October 2012
215-613 Mathematical Methods in Engineering

Semester 1/2555
9:00-12:00
Room: A 401

Name _____ ID _____

Direction:

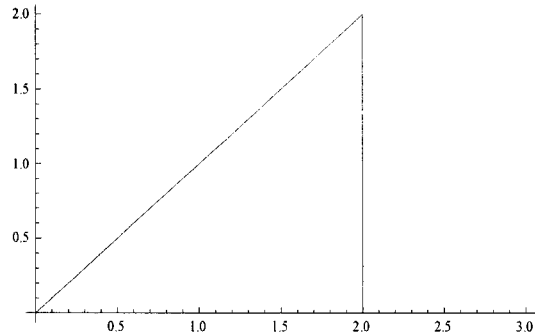
1. Open book exam. Everything is allowed.
2. There are total of 4 problems.

Problem	Full score	Your score
1	15	
2	20	
3	15	
4	10	
Total	60	

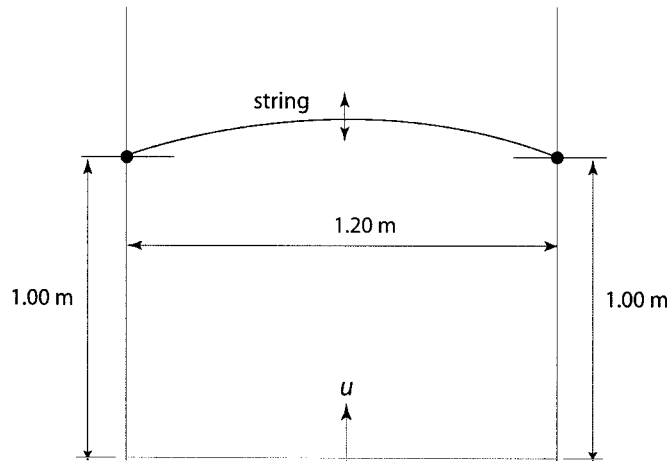
Perapong Tekasakul
Instructor

Final Test
Semester 1/2555
Total 60 points

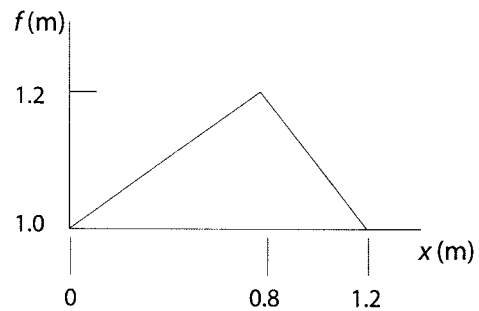
1. Find the Fourier Cosine series of the function below, if the period $p = 6$ (15 points)



2. A 1.20-m long elastic string where both ends are attached to the walls at 1.00 m high from the ground. The string is made to vibrate under initial conditions below. Determine position of the string at any time, t . Here $c^2 = 1 \text{ m}^2/\text{sec}^2$. (20 points)



$u(x,0) = f(x)$
 $\partial u / \partial t|_{t=0} = 0 \text{ m/sec}$
 where $f(x)$ is given as



3. The 1-D heat conduction in a semi-infinite bar has the following conditions:

$$\left. \frac{\partial T}{\partial x} \right|_{x=0} = 0 \quad \frac{^{\circ}\text{C}}{\text{m}}$$
$$T(x, 0) = \begin{cases} 100 \cos x \quad ^{\circ}\text{C}, & 0 < x \leq \pi/2 \\ 0 \quad ^{\circ}\text{C}, & x > \pi/2 \end{cases}$$

Determine the temperature profile in the rod at any time t . Do as much as you can.
(15 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)

$$2w - 3x + 2y - z = 4$$

$$2w + x - y - z = 2$$

$$-w - 2x + y + 3z = -1$$

$$-w - 4x + 2y - 4z = 1$$