

Math 322. Spring 2008  
Review Problems For The Final Exam

**Additional Problems**

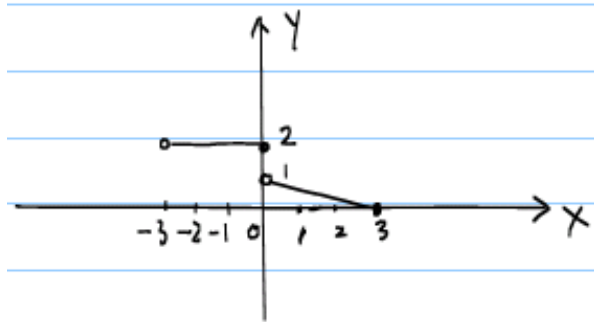
**Problem A.1:** Solve the the following initial value problem with Laplace transform.

$$\begin{aligned}\frac{d^2y}{dt^2} - y &= \delta(t - 3) \\ y(0) &= 0 \\ y'(0) &= 0\end{aligned}$$

**Problem A.2:** Solve the following wave equation.

$$\begin{aligned}u_{tt} - a^2u_{xx} &= 0 & 0 < x < l, t > 0 \\ u(0, t) = u(l, t) &= 0 & t > 0 \\ u(x, 0) &= \varphi(x) & 0 \leq x \leq l \\ u_t(x, 0) &= \psi(x) & 0 \leq x \leq l\end{aligned}$$

**Problem A.3:** Consider the **following** periodic function with period 6.



To what values does its Fourier series converge to at the following  $x$ ?

At  $x = -1$ , its Fourier series converges to the value of \_\_\_\_\_

At  $x = -3$ , its Fourier series converges to the value of \_\_\_\_\_

At  $x = 3$ , its Fourier series converges to the value of \_\_\_\_\_

At  $x = 0$ , its Fourier series converges to the value of \_\_\_\_\_

**Problem A.4:**

$$f(x) = \begin{cases} x & \text{if } 0 \leq x \leq 1 \\ 2 - x & \text{if } 1 \leq x \leq 2 \end{cases}$$

Find the sine series of  $f(x)$ .