

# MATH 206 HW9

**1)** Solve the initial value problem  $y''(t) + y(t) = f(t)$ ,  $y(0) = y'(0) = 0$ , where  $f(t)$  is the impulse train  $f(t) = \sum_{k=0}^{\infty} \delta(t - k\pi)$ . Verify that your solution satisfies the differential equation.

**2)** Solve the initial value problem  $y''(t) - 3y'(t) + 2y(t) = f(t)$ ,  $y(0) = y'(0) = 0$ , where  $f(t)$  is the function shown in Figure 1.

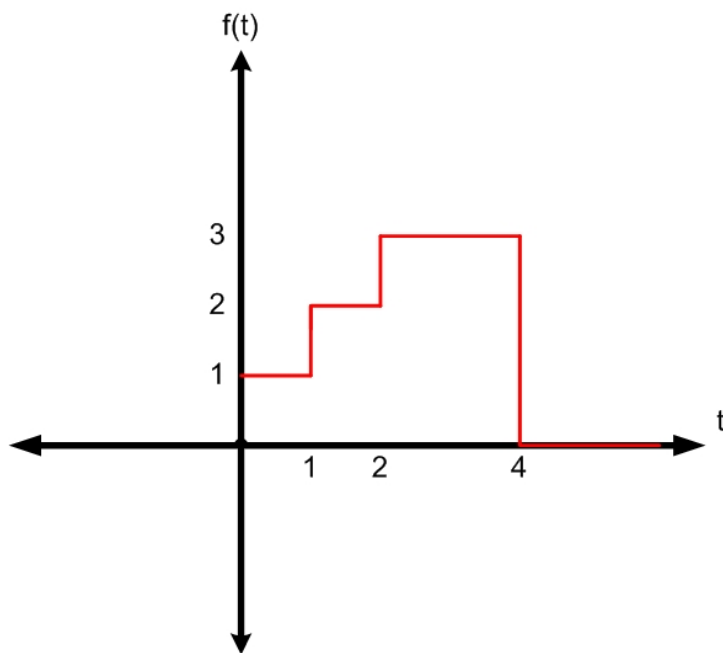


Figure 1: graph of  $f(t)$

**3)** Solve the following system of linear differential equations using Laplace Transform techniques:

$$\begin{aligned}x'' - 3x' + y' + 2x - y &= 0 \\x' + y' - 2x + y &= 0 \\x(0) &= 0 \\x'(0) &= 0 \\y(0) &= -1\end{aligned}$$

4) Find the inverse Laplace Transform of  $\frac{2s - 5}{(s^2 + 9)^2}$  .

5) Solve the differential equation  $y'' + 2y' + y = \sin(t)$ ,  $y(0) = 3, y'(0) = 1$  .