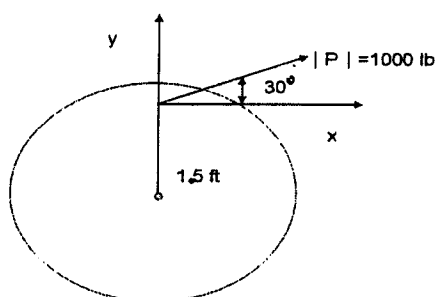


1. Using the convolution technique to solve the following differential equation for general solution. (20%)

$$y'' + 3y' + 2y = r(t), \quad r(t) = 1 \text{ if } 1 < t < 2 \text{ and } 0 \text{ otherwise,}$$

$$y(0) = y'(0) = 0$$

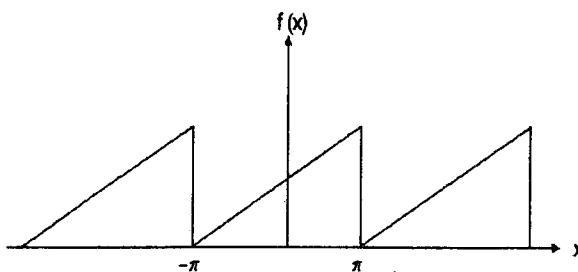
2. Find the moment of the force p (參考圖一) about the center of the wheel. (20%) (Hint: using vector product)



圖一

3. If the probability of producing a defective screw is $p = 0.01$, what is the probability that a lot of 100 screws will contain more than 2 defectives? (20%)

4. Find the Fourier series of the function (圖二). (20%)



圖二

5. Evaluate $\iint_S (7xi - zk) \cdot n \, dA$ over the sphere $S: x^2 + y^2 + z^2 = 4$ (20%)