1. Determine whether the following systems are linear or nonlinear?
   a. $y(n) = nx(n^2)$
   b. $y(n) = x(n+2)$
   c. $y(n) = x^2(n+1)$

2. The impulse response of a linear time-invariant system is: h(n) = {1, 2, **3** ,-2, 3} , Now determine the response of the system to the input signal: x(n)={5, 4, 3, **2**, -1} [Bold underlined number marks the center point]

3. With the proper example and mathematical equation briefly explain:
   a. Zero state response b. Zero input response

4. Given two signal, x(n) = {1, 2, **3** ,-2, 3} and y(n) = {5, 4, 3, **2**, -1} find out and sketch the cross-correlation between the signals and also determine and sketch the auto-correlation of x(n). [Bold underlined number marks the center point]

5. Determine the response y(n), n>=0, of the system described by the second-order difference equation

$$y(n) - 3y(n-1) - 4y(n-2) = x(n) + 2x(n-1)$$

Where the input sequence is $x(n) = 4^n u(n)$