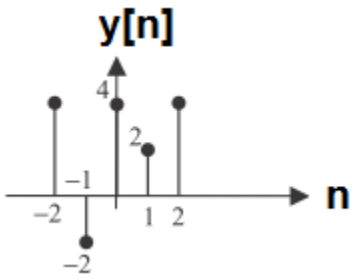
| Electronics & Communication<br>Shoubra Faculty of Engineering<br>Benha University | **Assignment No (2)** | **DSP (2014)** |
|---|---|---|

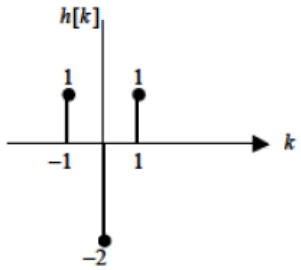
1. Which of the following system is linear:
   a) Differentiator $y[n] = \frac{dx[n]}{dn}$
   b) Amplifier $y[n] = 5\,x[n]$
   c) Square time $y[n] = x[n^2]$
2. Consider two DT systems with the following input–output relationships:
   a) $y[n] = x[n]+2$
   b) $y[n] = k\,x[n]$

   Determine if the systems are time-invariant.

3. For a DT linear, time-invariant system, an input x[n] produces an output y[n] as shown in Figure. Sketch the outputs for the following set of inputs:
   a) x[−n]
   b) 2x[n − 1]
   c) x[n + 1] − x[n − 1]




4. The output h[k] of a DT LTI system in response to a unit impulse function δ[k] is shown in Figure. Find the output for the following input: x[k] = δ[k+1] + δ[k] + δ[k-1]




5. Find y[n] = x[n]*h[n], where:
   x[n] = u[n] –u[n-3] , h[n] = u[n] –u[n-5] , determine the convolution duration.