Assignment-2 (to be submitted offline)

Q1. Suppose given $x[n] = \delta[n] + 2\,\delta[n-1] - \delta[n-3]$ and $h[n] = 2\delta[n+1] + 2\delta[n-1]$. Evaluate the following convolutions:

$(a)\ y[n] = x[n] * h[n]$
$(b)\ y[n] = x[n+2] * h[n]$
$(c)\ y[n] = x[n] * h\,[n+2]$

Q2. Compute the output of the a LTI system where $x[n] = \begin{cases} 1, & 3 \le n \le 8 \\ 0, & \text{otherwise} \end{cases}$ $\quad h[n] = \begin{cases} 1, & 4 \le n \le 15 \\ 0, & \text{otherwise} \end{cases}$

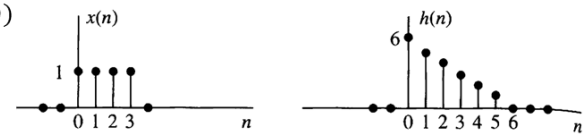
Q3. Show that $(a)\ \delta(n) = u(n) - u(n-1)$
$(b)\ u(n) = \sum_{k=-\infty}^{n} \delta(k) = \sum_{k=0}^{\infty} \delta(n-k)$

Q4. Compute the convolution $y(n) = x(n) * h(n)$

$(a)\quad x(n) = \begin{cases} 1, & n = -2, 0, 1 \\ 2, & n = -1 \\ 0, & else \end{cases}$

$h(n) = \delta(n) - \delta(n-1) + \delta(n-4) + \delta(n-5)$

(b)



Q5. Justify whether following systems related by input -output are memoryless, time invariant, linear, Causal, Stable

$(a)\ y(t) = x(t-4)$
$(b)\ y[n] = n\,x[n]$
$(c)\ y[n] = x[1-n]$
$(d)\ y[n] = \begin{cases} x\left[\frac{n}{2}\right], & n\ even \\ 0, & n\ odd \end{cases}$