

AUSTRALIAN NATIONAL UNIVERSITY
Department of Engineering

ENGN6612/4612 Digital Signal Processing and Control
 Problem Set #1 Digital Signals

Q1

Sketch and label carefully each of the following discrete time signals:

- (a) $u[n-2]$
- (b) $u[-n]$
- (c) $u[4-n]$
- (d) $2\delta[n-5]$
- (e) $2h[n-1]$ where $h[n] = \delta[n] + \delta[n-1] + \delta[n-2]$
- (f) $h[1-n]$ where $h[n] = \delta[n] + \delta[n-1] + \delta[n-2] + 2\delta[n-3]$
- (g) $x[-1]\delta[n+1]$ where $x[n] = +3\delta[n+1] - 0.5\delta[n] + 2\delta[n-1]$
- (h) $\cos[n]u[n-1]$
- (i) $u[k-n]$ when $k > 0$
- (j) $u[k-n]$ when $k < 0$

Note that $\delta[n]$ is the discrete-time unit impulse and $u[n]$ is the discrete-time unit step function respectively.

Also plot the signals in Matlab.

(see example digital signals plotted in L02_CommonSignals.m)

Q2

Write an equation to describe each of the following discrete time signals:

(a)

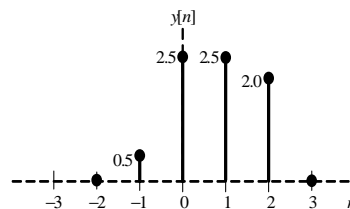


Figure 1: Figure Q2(a)

(b)

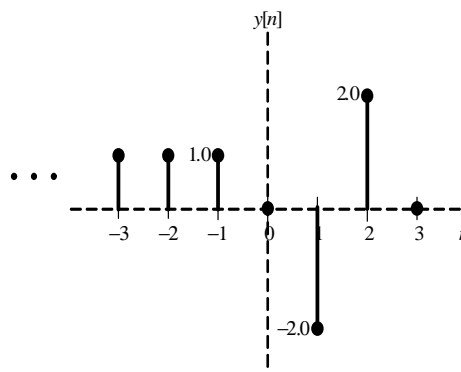


Figure 2: Figure Q2(b)

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ENGN6612/4612 Digital Signal Processing and Control
Problem Set #1 Solution

Q1

Please see attached pages 3 and 4.

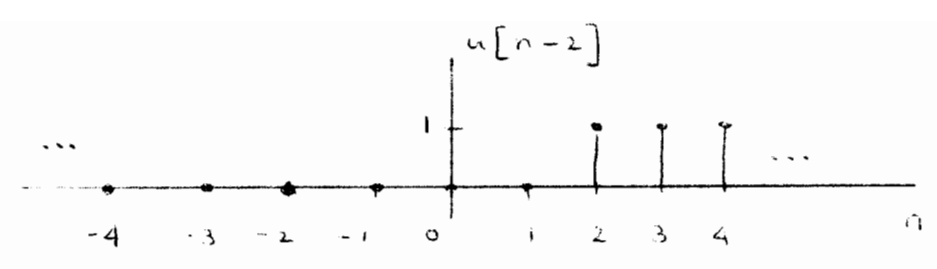
Q2**(a)**

$$y[n] = 0.5 \delta[n+1] + 2.5 \delta[n] + 2.5 \delta[n-1] + 2.0 \delta[n-2]$$

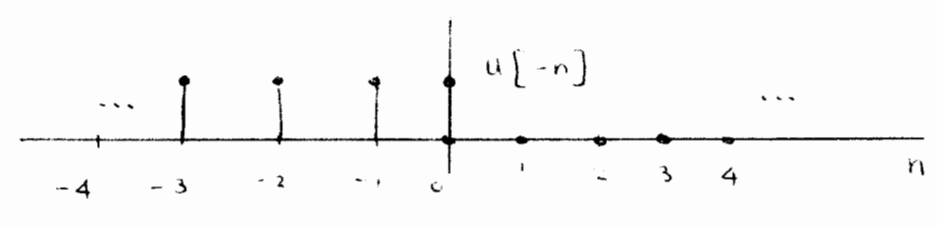
(b)

$$y[n] = u[-1-n] - 2.0 \delta[n-1] + 2.0 \delta[n-2]$$

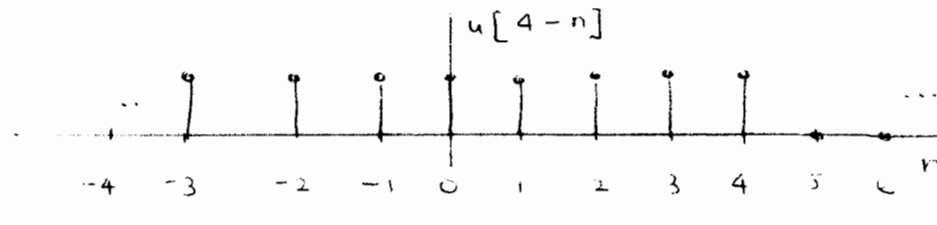
Q1 (a)



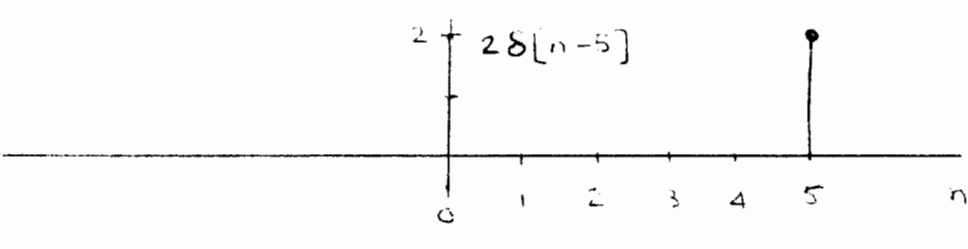
(b)



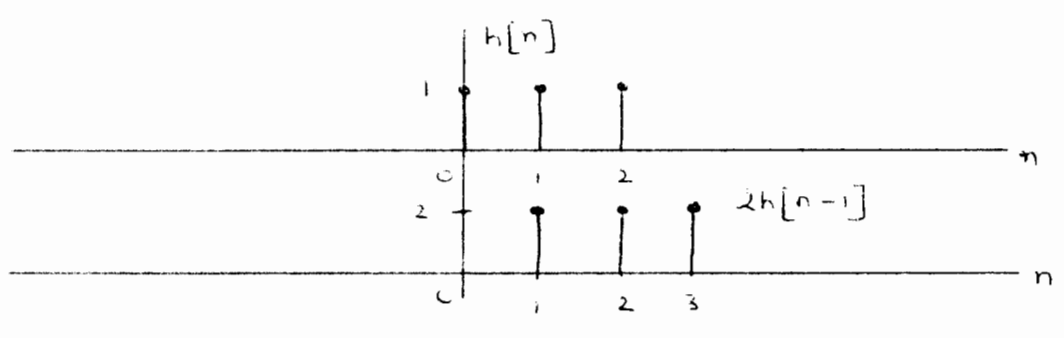
(c)



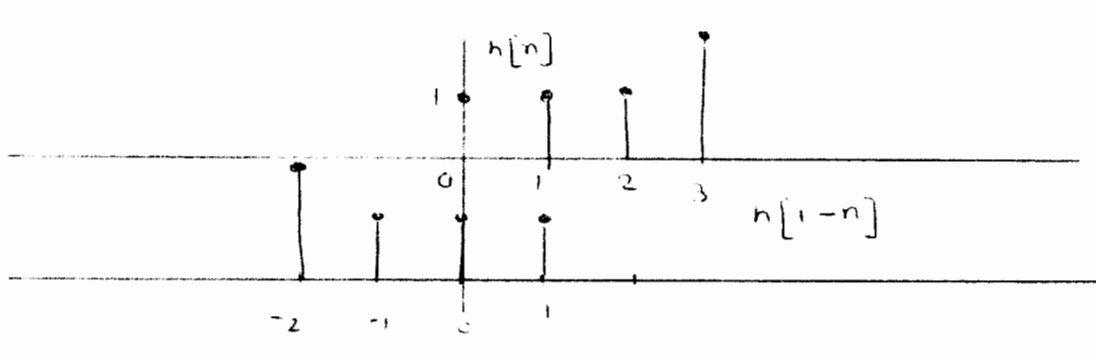
(d)



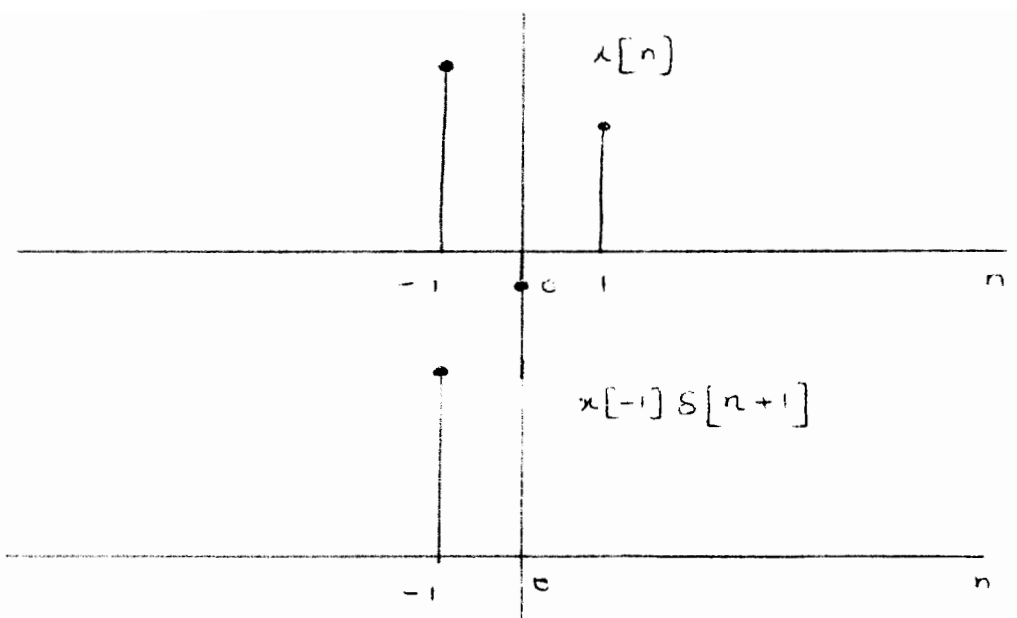
(e)



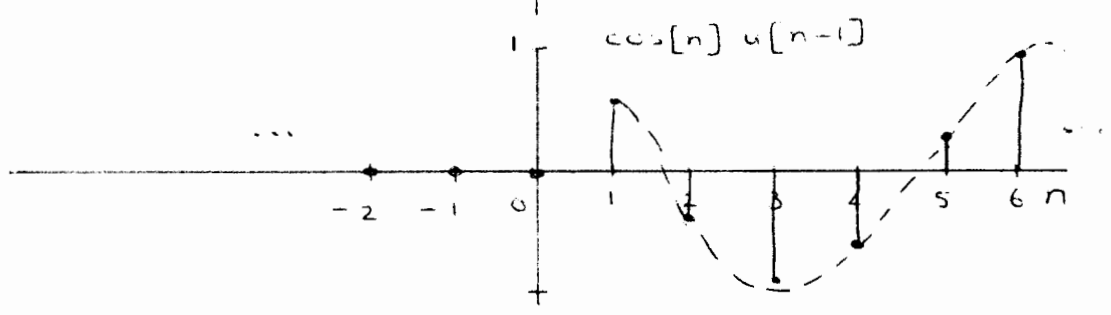
(f)



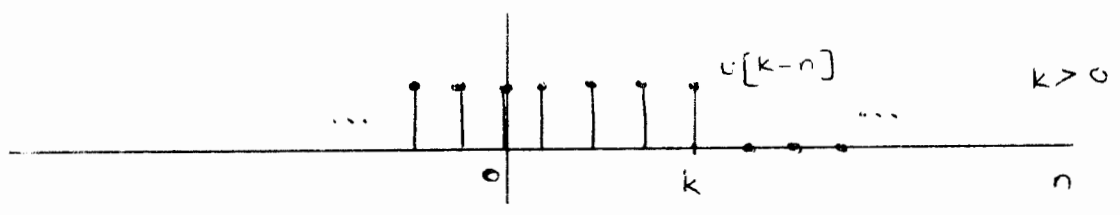
(g)



(h)



(i)



(j)

