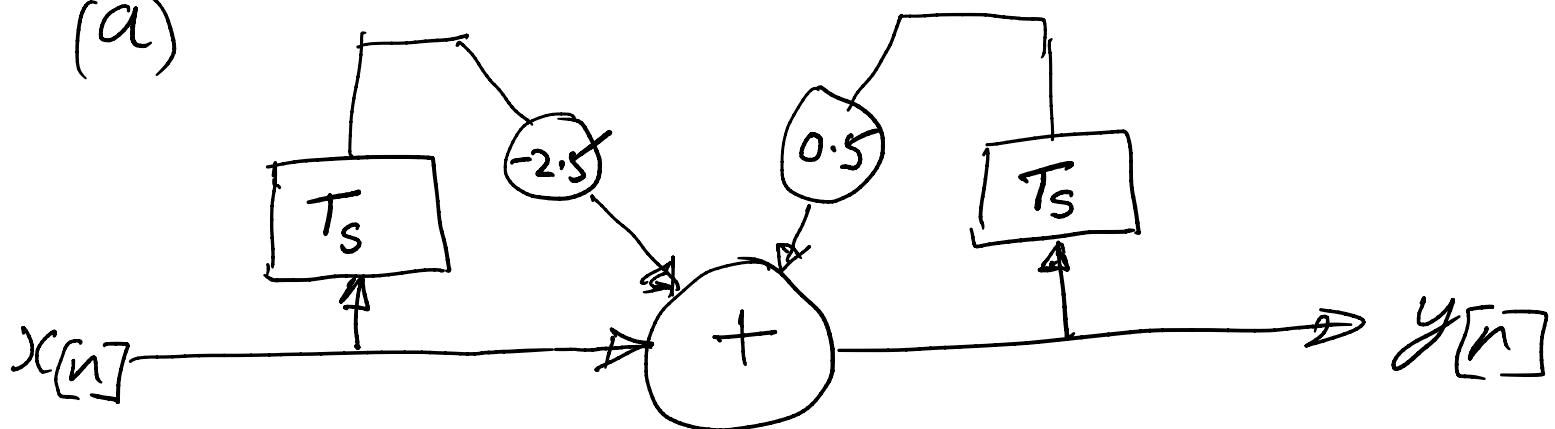


SOLUTIONS ASSIGNMENT 1

ELET 3230

1.

(a)



(b) $h[n] = 0.5h[n-1] + s[n] - 2.5s[n-1]$

(c)

$$x[0] = 1$$

$$x[1] = 2$$

$$x[2] = 3$$

$$x[3] = 4$$

$$x[4] = 0$$

$$x[5] = 0$$

$$h[0] = 1$$

$$h[1] = 0.5[1] - 2.5 = -2$$

$$h[2] = 0.5[-2] = -1$$

$$h[3] = 0.5[-1] = -0.5$$

$$h[4] = 0.5[-0.5] = -0.25$$

$$h[5] = 0.5[-0.25] = -0.125$$

$$\begin{array}{r}
 h = 0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5 \\
 x[n] = 1 \quad 2 \quad 3 \quad 4 \quad 0 \quad 0 \\
 h[n] = 1 \quad -2 \quad -1 \quad -0.5 \quad -0.25 \quad -0.125 \\
 \hline
 1 \cdot h[n] = 1 \quad -2 \quad -1 \quad -0.5 \quad -0.25 \quad -0.125 \\
 2 \cdot h[n-1] = 0 \quad 2 \quad -4 \quad -2 \quad -1 \quad -0.5 \\
 3 \cdot h[n-2] = 0 \quad 0 \quad 3 \quad -6 \quad -3 \quad -1.5 \\
 4 \cdot h[n-3] = 0 \quad 0 \quad 0 \quad 4 \quad -8 \quad -4 \\
 \hline
 y[n] = 1 \quad 0 \quad -2 \quad -4.5 \quad -12.25 \quad -6.125
 \end{array}$$

$$y[0] = 0.5 [0] + [1] - 2.5 [0] = 1$$

$$y[1] = 0.5 [1] + [2] - 2.5 [1] = 0$$

$$y[2] = 0.5 [0] + [3] - 2.5 [2] = -2$$

$$y[3] = 0.5 [-2] + [4] - 2.5 [3] = -4.5$$

$$y[4] = 0.5 [-4.5] + [0] - 2.5 [4] = -12.25$$

$$y[5] = 0.5 [-12.25] + [0] - 2.5 [0] = -6.125$$

$$2. \quad H(j\omega) = \frac{Y(j\omega)}{X(j\omega)} = \frac{0.5}{1 + 0.8e^{-j\omega}}$$

$$Y(j\omega) [1 + 0.8e^{-j\omega}] = X(j\omega) 0.5$$

$$y[n] + 0.8y[n-1] = 0.5x[n]$$

$$y[n] = -0.8y[n-1] + 0.5x[n]$$

$$s[n] = -0.8s[n-1] + 0.5u[n]$$

$$s[0] = -0.8[0] + 0.5[1] = 0.5$$

$$s[1] = -0.8[0.5] + 0.5 = 0.1$$

$$s[2] = -0.8[0.1] + 0.5 = 0.42$$

$$s[3] = -0.8[0.42] + 0.5 = 0.164$$

$$s[4] = -0.8[0.164] + 0.5 = 0.3688$$

$$Y_{ss} [1 + 0.8] = 0.5$$

$$Y_{ss} = \frac{0.5}{1 + 0.8} = 0.27$$

$$3. \quad T_S = \frac{1}{50} = 0.02 S$$

$$S(0.02) = 2.248 + (-0.368) \\ = 1.88 = X[1]$$

$$S(0.04) = 1.589 + (-0.684) \\ = 0.905 = X[2]$$

$$Y[2] = X[2] - X[1] \\ = 0.905 - 1.88 = -0.975$$