

Exercises Week 3

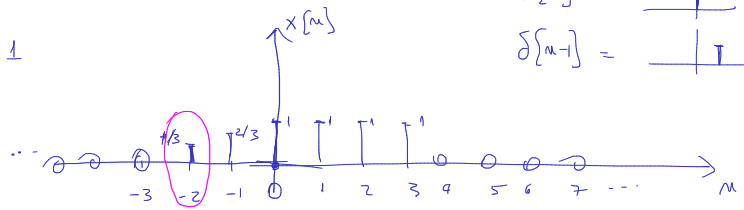
$$\delta[n+1] = \begin{array}{c} | \\ \hline 1 \end{array}$$

$$\delta[n] = \begin{array}{c} | \\ \hline 1 \end{array}$$

$$\delta[n-1] = \begin{array}{c} | \\ \hline 1 \end{array}$$

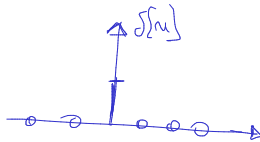
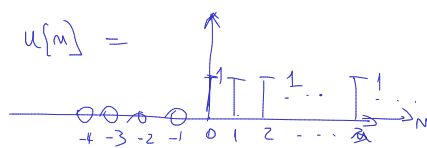
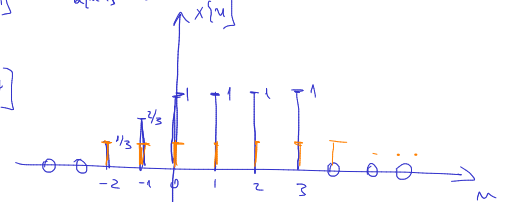
①

$$x[n] = \begin{cases} 1 + \frac{n}{3}, & -3 \leq n \leq -1 \\ 1, & 0 \leq n \leq 3 \\ 0, & \text{elsewhere} \end{cases}$$

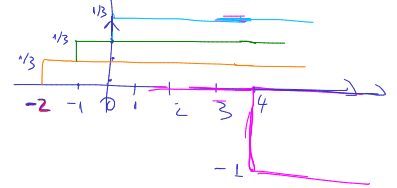
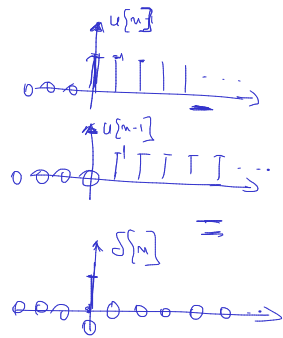


$$a). \quad x[n] = \underbrace{\frac{1}{3} \cdot \delta[n+2]}_{\sigma} + \underbrace{\frac{2}{3} \cdot \delta[n+1]}_{u[n+1]-u[n]} + \underbrace{1 \cdot \delta[n]}_{u[n]-u[n-1]} + \underbrace{1 \cdot \delta[n-1]}_{u[n]-u[n-1]} + \underbrace{1 \cdot \delta[n-2]}_{u[n]-u[n-1]} + \underbrace{1 \cdot \delta[n-3]}_{u[n]-u[n-1]}$$

$$b). \quad x[n] = \underbrace{\frac{1}{3} \cdot u[n+2]}_{\sigma} + \frac{1}{3} \cdot u[n+1] + \frac{1}{3} u[n] - u[n-4]$$



$$\delta[n] = u[n] - u[n-1]$$

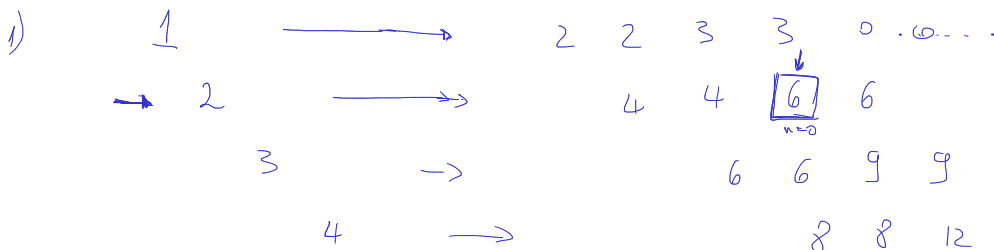


②

$$x_1[n] = \{ \dots, 0, 1, 2, 3, 4, 0, \dots \}$$

$$y[n] = x_1[n] * x_2[n]$$

$$x_2[n] = \{ \dots, 0, 2, 2, 3, 3, 0, \dots \}$$



$$\{ \dots, 1, 2, 3, 4 \} \rightarrow \{ 2, 6, 13, 23, 23, 21, 12 \}$$

$$y[n] = \{ \dots, 2, 6, 13, 23, 23, 21, 12, \dots \}$$

2).

$X_2[n-k]$ = shift
insert

| $X_1[k]$ | 1 | 2 | 3 | 4 |
|----------|---|---|---|---|
|----------|---|---|---|---|

3 3 2 2

→ 2

3 3 2 2

→ $1 \cdot 2 + 2 \cdot 2 = 6$

3 3 2 2

→ $1 \cdot 3 + 2 \cdot 2 + 3 \cdot 2 = 13$

3 3 2 2

→ $1 \cdot 3 + 2 \cdot 3 + 3 \cdot 2 + 4 \cdot 2 = 23$

3 3 2 2

→ $2 \cdot 3 + 3 \cdot 3 + 4 \cdot 2 = 23$

3 3 2 2

→ $3 \cdot 3 + 12 = 21$

3 3 2 2

→ $4 \cdot 3 = 12$

$$y[n] = \{0, 2, 6, 13, 23, 23, 21, 12, 0, \dots\}$$

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