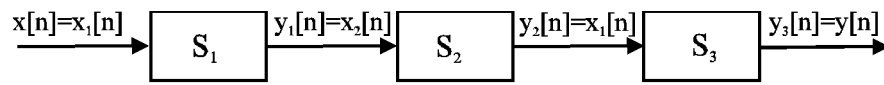
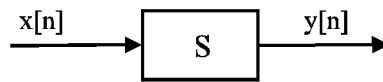


Opg 6.12

a)



Ækvivalent med:



$$S_1: \quad y_1[n] = x_1[n] - x_1[n-1] \quad \{b_k\} = \{1, -1\}$$

$$S_2: \quad y_2[n] = x_2[n] + x_2[n-2] \quad \{b_k\} = \{1, 0, 1\}$$

$$S_3: \quad y_3[n] = x_3[n-1] + x_3[n-2] \quad \{b_k\} = \{0, 1, 1\}$$

$$\begin{aligned} S: \quad y[n] &= y_3[n] = x_3[n-1] + x_3[n-2] = y_2[n-1] + y_2[n-2] \\ &= x_2[n-1] + x_2[n-3] + x_2[n-2] + x_2[n-4] \\ &= y_1[n-1] + y_1[n-2] + y_1[n-3] + y_1[n-4] \\ &= x_1[n-1] - x_1[n-2] + x_1[n-2] - x_1[n-3] + x_1[n-3] - x_1[n-4] + x_1[n-4] - x_1[n-5] \\ &= \underline{x[n-1] - x[n-5]} \quad \{b_k\} = \{0, 1, 0, 0, 0, -1\} \end{aligned}$$

$$\begin{aligned} \text{b)} \quad S_1: \quad H_1(\hat{\omega}) &= 1 - e^{-j\hat{\omega}} \\ S_2: \quad H_2(\hat{\omega}) &= 1 + e^{-j2\hat{\omega}} \\ S_3: \quad H_3(\hat{\omega}) &= e^{-j\hat{\omega}} + e^{-j2\hat{\omega}} \end{aligned}$$

$$\begin{aligned} H(\hat{\omega}) &= H_1(\hat{\omega})H_2(\hat{\omega})H_3(\hat{\omega}) = (1 - e^{-j\hat{\omega}})(1 + e^{-j2\hat{\omega}})(e^{-j\hat{\omega}} + e^{-j2\hat{\omega}})e^{-j\hat{\omega}} \\ &= e^{-j\hat{\omega}}(1 - e^{-j\hat{\omega}})(1 + e^{-j\hat{\omega}})(1 + e^{-j2\hat{\omega}}) = e^{-j\hat{\omega}}(1 - e^{-j2\hat{\omega}})(1 + e^{-j2\hat{\omega}}) \\ &= e^{-j\hat{\omega}}(1 - e^{-j4\hat{\omega}}) = \underline{e^{-j\hat{\omega}} - e^{-j5\hat{\omega}}} \quad \text{Igen fås: } \{b_k\} = \{0, 1, 0, 0, 0, -1\} \end{aligned}$$

$$\Rightarrow \quad \underline{y[n] = x[n-1] - x[n-5]} \quad \text{som før.}$$