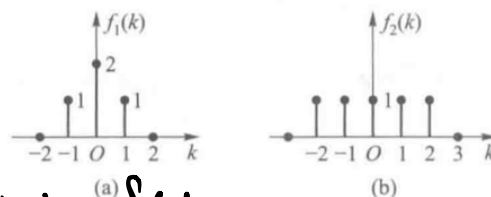


3.11 (1)

3.11 各序列的图形如题 3.11 图所示, 求下列卷积和。

(1) $f_1(k) * f_2(k)$

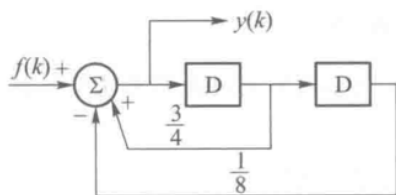


$$f_1(k) = \delta(k+1) + 2\delta(k) + \delta(k-1)$$

$$f_2(k) = \varepsilon(k+2) - \varepsilon(k-2)$$

$$\begin{aligned} \therefore f_1(k) * f_2(k) &= \varepsilon(k+3) * \delta(k) + 2\varepsilon(k+2) * \delta(k) \\ &\quad + \varepsilon(k+1) * \delta(k) - \varepsilon(k-1) * \delta(k) \\ &\quad - 2\varepsilon(k-2) * \delta(k) - \varepsilon(k-3) * \delta(k) \\ &= \varepsilon(k+3) + 2\varepsilon(k+2) + \varepsilon(k+1) - \varepsilon(k-1) \\ &\quad - 2\varepsilon(k-2) - \varepsilon(k-3) \end{aligned}$$

3.17 3.17 题 3.17 图所示系统,若激励 $f(k) = (0.5)^k \varepsilon(k)$,求系统的零状态响应。



题 3.17 图

$$\frac{3}{4} y(k-1) - \frac{1}{8} y(k-2) + f(k) = y(k)$$

$$\therefore 6y(k-1) - y(k-2) - 8y(k) = 8f(k)$$

$$\therefore 8y_{zs}(k) - 6y_{zs}(k-1) + y_{zs}(k-2) = 8f(k)$$

$$y_{zs}(-1) = y_{zs}(-2) = 0.$$

$$y_{zs}(0) = -\frac{3}{4} y_{zs}(-1) + \frac{1}{8} y_{zs}(-2) + 1 = 1.$$

$$y_{zs}(1) = -\frac{3}{4} y_{zs}(0) + \frac{1}{8} y_{zs}(-1) + 0.5 = \frac{3}{4}$$

$$\text{方程特征根为 } \lambda_1 = \frac{1}{2}, \lambda_2 = \frac{1}{4}.$$

$$\therefore y_{zs}(k) = C_{z1} \left(\frac{1}{2}\right)^k + C_{z2} \left(\frac{1}{4}\right)^k$$

$$\text{代入初始值. } C_{z1} = 2, \quad C_{z2} = -1.$$

$$\therefore y_{zs}(k) = 2\left(\frac{1}{2}\right)^k - \left(\frac{1}{4}\right)^k, \quad k \geq 0.$$