

September
185-186
(9) (b)

$$3y[n] - 4y[n-1] + y[n-2] = x[n]$$

$$x[n] = \left(\frac{1}{2}\right)^n$$

$$y[-1] = 1$$

$$y[-2] = 2$$

$$3y[2] - 4(2^{-1}y[2] + y[-1]) + (2^{-2}y[2] + 2^{-1}y[-1] + y[-2]) = x[2]$$

$$(3 - 4 \cdot 2^{-1} + 2^{-2})y[2] = (4 - 2^{-1})y[-1] - y[-2] + x[2]$$

$$= \frac{4-2}{2} - 2^{-1} + x[2]$$

$$= 2 - 2^{-1} + \frac{1}{1 - 1/2 \cdot 2^{-1}}$$

$$1^2 - 4s + 3$$

$$p^2 = 4$$

$$s = \frac{4 \pm 2}{2} = 1, 3$$

$$\frac{(2^{-1}-3)(2^{-1}-1)}{(3-2^{-1})(1-2^{-1})} = \frac{1}{3} \frac{(2-2^{-1})}{(1-1/3 \cdot 2^{-1})(1-2^{-1})}$$

$$y[2] = \frac{1}{3} \frac{(2-2^{-1})}{(1-1/3 \cdot 2^{-1})(1-2^{-1})} + \frac{1/3}{(1-1/3 \cdot 2^{-1})(1-2^{-1})}$$

$$y[2] = \frac{A}{(1-1/3 \cdot 2^{-1})} + \frac{B}{(1-2^{-1})} + \frac{\bar{A}}{(1-1/3 \cdot 2^{-1})} + \frac{\bar{B}}{(1-2^{-1})} + \frac{\bar{C}}{(1-1/2 \cdot 2^{-1})}$$

$$A = \frac{1}{3} \frac{(2-2^{-1})}{1-2^{-1}} \Big|_{2^{-1}=3} = \frac{-1/3}{-2} = 1/6$$

$$\bar{A} = \frac{1/3}{(1-2^{-1})(1-1/2 \cdot 2^{-1})} \Big|_{2^{-1}=3} = \frac{1/3}{-2 \cdot (-1/2)} = 1/3$$

$$A + \bar{A} = 1/2$$

$$B = \frac{1/3(2-2^{-1})}{(1-1/3 \cdot 2^{-1})} \Big|_{2^{-1}=1} = \frac{1/3}{1-1/3} = 1/2$$

$$\bar{B} = \frac{1/3}{(1-1/3 \cdot 2^{-1})(1-1/2 \cdot 2^{-1})} \Big|_{2^{-1}=1} = \frac{1/3}{2/3 \cdot 1/2} = 1$$

$$\Rightarrow B + \bar{B} = 3/2$$

$$\bar{C} = \frac{1/3}{(1-1/3 \cdot 2^{-1})(1-2^{-1})} \Big|_{2^{-1}=2} = \frac{1/3}{(1/3)(-1)} = -1$$

$$y[2] = \frac{1/2}{1-1/3 \cdot 2^{-1}} + \frac{3/2}{1-2^{-1}} - \frac{1}{1-1/2 \cdot 2^{-1}}$$

$$y[n] = \left[3/2 + 1/2 \left(1/3 \right)^n - \left(1/2 \right)^n \right] u[n]$$

$$z(x[k \cdot h_0]) = z^{h_0} x[2]$$

$$= x[0] z^{h_0}$$

$$= x[1] z^{h_0-1}$$

$$= x[h_0-1] z$$

$$z(x[k \cdot h_0]) = z^{h_0} x[2]$$

$$+ x[-1] z^{-h_0+1}$$

$$+ x[-2] z^{-h_0+2}$$

$$\dots x[-h_0]$$