

$$y[n-2] - 2y[n-1] + y[n] = 3(-1)^n u[n]$$

$$y[-1] = -1$$

$$y[-2] = -1$$

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

$$(z^{-2} - 2z^{-1} + 1)y(z) = -z^{-1}(-1) - (-1) + 2(-1) + \frac{3}{1+z^{-1}}$$

$$y(z) = \frac{(z^{-1} - 1)(1+z^{-1}) + 3}{(1-z^{-1})^2(1+z^{-1})} = \frac{2+z^{-2}}{(1-z^{-1})^2(1+z^{-1})}$$

$$= \frac{A}{1+z^{-1}} + \frac{B}{(1-z^{-1})^2} + \frac{C}{(1-z^{-1})}$$

$$A = \frac{2+z^{-2}}{(1-z^{-1})^2} \Big|_{z^{-1}=-1} = \frac{3}{4} \quad 2+(-1)^2$$

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

$$A(1-z^{-1})^2 + B(1+z^{-1}) + C(1-z^{-1})(1+z^{-1}) = 2-z^{-2}$$

$$z^{-1} = 0$$

$$A + B + C = 2$$

$$3/4 + 6/4 + C = 2$$

$$\Rightarrow \boxed{C = -1/4}$$

$$y(z) = 3/4 \frac{1}{1+z^{-1}} + 3/2 \left(\frac{(1-z^{-1})}{(1-z^{-1})^2} + \frac{z^{-1}}{(1-z^{-1})^2} \right) - \frac{1/4}{1-z^{-1}}$$

$$z^{-1} \left(= 3/4 \frac{1}{1+z^{-1}} + \frac{5/4}{1-z^{-1}} + \frac{3/2 z^{-1}}{(1-z^{-1})^2} \right)$$

$$y[n] = \left[3/4 (-1)^n + 5/4 + \frac{3n}{2} \right] u[n]$$

$$y[-1] = -3/4 + 5/4 - 3/2 = -1$$

$$y[-2] = \frac{3/4 + 5/4}{2} - 3 = -1$$