$$y(n) - \frac{1}{9}y(n-2) = u(n)$$

$$u(n) = 80 \cdot 3^n \mu(n) \qquad y(-1) = 18 \qquad y(-2) = 0$$

Z-Transformacija

$$y(n) \to Y(z)$$

$$y(n-2) \to z^{-2}Y(z) + z^{-1}y(-1) + y(-2) = z^{-2}Y(z) + 18z^{-1}$$

$$u(n) \to U(z) = 80\frac{z}{z-3}$$

Sad uvrštavamo u sustav

$$Y(z) - \frac{1}{9}z^{-2}Y(z) - 2z^{-1} = U(z)$$

$$Y(z) = U(z)\frac{1}{1-\frac{1}{9}z^{-2}} + \frac{2z^{-1}}{1-\frac{1}{9}z^{-2}}$$

$$Y(z) = 80\frac{z}{z-3}\frac{z^2}{z^2-\frac{1}{9}} + \frac{2z}{z^2-\frac{1}{9}} = \frac{80z^3 + 2z(z-3)}{(z-3)(z^2-\frac{1}{9})}$$

$$Y(z) = \frac{80z^3 + 2z^2 - 6z}{(z-3)\left(z-\frac{1}{3}\right)\left(z+\frac{1}{3}\right)}$$

$$Y_1(z) = \frac{Y(z)}{z} = \frac{80z^2 + 2z - 6}{(z-3)\left(z-\frac{1}{3}\right)\left(z+\frac{1}{3}\right)} = \frac{81}{z-3} + \frac{-2}{z-\frac{1}{3}} + \frac{1}{z+\frac{1}{3}}$$

$$Y(z) = zY_1(z) = \frac{81z}{z-3} + \frac{-2z}{z-\frac{1}{3}} + \frac{1z}{z+\frac{1}{3}}$$

Konačno

$$y(n) = \left(81 \cdot 3^n - 2 \cdot \left(\frac{1}{3}\right)^n + 1 \cdot \left(-\frac{1}{3}\right)^n\right)\mu(n)$$