M. Masyim Abdillah P. 1101191095 TT-43-11

1. a. $x_1(n) = \{1, 3, 4, 6, 0, 2\}$

$X_1(z) = 1 + 3z^{-1} + 4z^{-2} + 6z^{-3} + 2z^{-5}$

b. $x_2(n) = \{1, 2, \underset{\uparrow}{5}, 7, 0, 1\}$

$X_2(z) = z^2 + 2z^1 + 5 + 7z^{-1} + z^{-3}$

2. a. $x_1(n) = \delta(n)$

$X_1(z) = 1$

b. $x_2(n) = \delta(n-2)$

$X_2(z) = z^{-2}$

c. $x_3(n) = \delta(n+4)$

$X_3(z) = z^4$

3. $x(n) = 2u(n)$

$$X(z) = 2 \cdot \frac{1}{1 - z^{-1}} = \frac{2}{1 - z^{-1}}$$

4. $x(n) = 2^n \cdot u(n)$

$$X(z) = \frac{1}{1 - 2z^{-1}}$$

5. $x(n) = \left[2(3)^n - 5(3)^n\right] u(n)$

$x(n) = \left[-3(3)^n\right] u(n)$

$$X(z) = -3 \cdot \frac{1}{1 - 3z^{-1}} \qquad |z| > 3$$

$$X(z) = -\frac{3}{1 - 3z^{-1}} \qquad |z| > 3$$

6. $$X(z) = \frac{2 - 1{,}5\,z^{-1}}{1 - 1{,}5\,z^{-1} + 0{,}5\,z^{-2}} = \frac{2z^{-1}}{z^{-1}} \cdot \frac{z - 0{,}75}{z^2 - 1{,}5z + 0{,}5}$$

$$= \frac{2z(z - 0{,}75)}{(z-1)(z-0{,}5)}$$

Pole : $P_1 = 1$ $P_2 = 0{,}5$

Zero : $Z_1 = 0$ $Z_2 = 0{,}75$

7. $$X(z) = \frac{1 + z^{-1}}{1 - z^{-1} + 0{,}5z^{-2}} = \frac{z^{-1}}{z^{-2}} \cdot \frac{z + 1}{z^2 - z + 0{,}5}$$

$$= \frac{z(z+1)}{z^2 - z + 0{,}5}$$

Zero : $Z_1 = 0$ $Z_2 = -1$

Pole : $P_1 = 0{,}5 + j0{,}5$ $P_2 = 0{,}5 - j0{,}5$

8. $Y[n] = 0{,}64\,Y[n-2] + x[n] + x[n-1]$

a. Ya, sistem merupakan sistem kausal

b. $Y[n] = 0{,}64\,Y[n-2] + x[n] + x[n-1]$

$Y(z) = 0{,}64z^{-2}\,Y(z) + X(z) + z^{-1}X(z)$

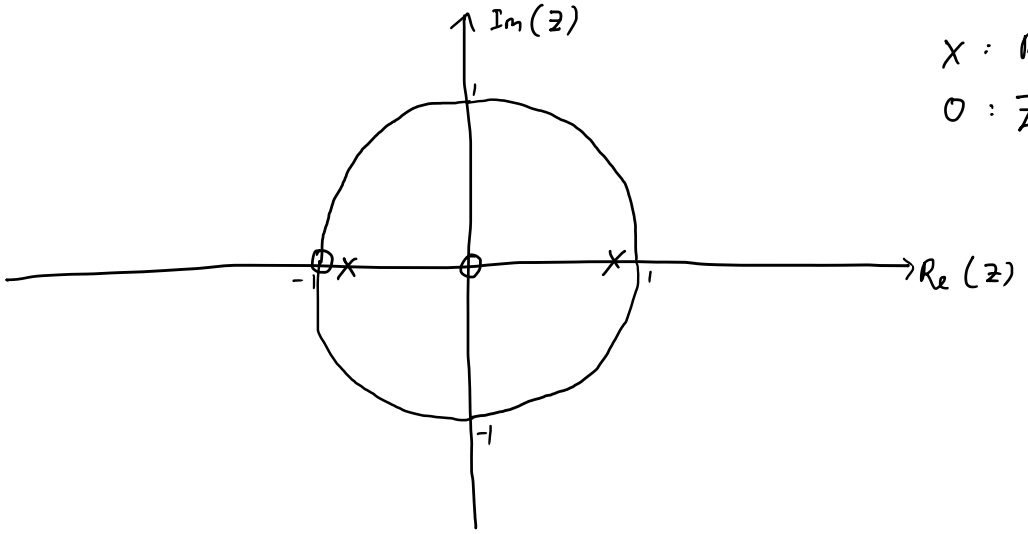
$(1 - 0{,}64z^{-2})\,Y(z) = (1 + z^{-1})\,X(z)$

$$\frac{Y(z)}{X(z)} = \frac{1 + z^{-1}}{1 - 0{,}64z^{-2}} \cdot \frac{z^2}{z^2}$$

$$H(z) = \frac{z^2 + z}{z^2 - 0{,}64} = \frac{z(z+1)}{(z+0{,}8)(z-0{,}8)}$$

c. Pole : $P_1 = -0{,}8$ $P_2 = 0{,}8$

Zero : $Z_1 = 0$ $Z_2 = -1$



X : Pole
O : Zero

d. $H(z) = \dfrac{z(z+1)}{(z+0{,}8)(z-0{,}8)}$

$R_1 : |z| > 0{,}8$

$R_2 : |z| > -0{,}8$

$ROC : R_1 \cap R_2 : |z| > 0{,}8$

e. Syarat stabil : $ROC \supseteq |z| = 1$

Karena $ROC : |z| > 0{,}8$ maka sistem stabil

f. $H(z) = \dfrac{z(z+1)}{(z+0{,}8)(z-0{,}8)} = -\dfrac{1}{9} \cdot \dfrac{z}{z+0{,}8} + \dfrac{9}{9} \dfrac{z}{z-0{,}8}$

$h[n] = -\dfrac{1}{9}(-0{,}8)^n u(n) + \dfrac{9}{9}(0{,}8)^n u(n)$

$h[n] = \left[-\dfrac{1}{9}(-0{,}8)^n + \dfrac{9}{9}(0{,}8)^n \right] u(n)$

g. $X[n]$