

PTC2324: Processamento Digital de Sinais I

Respostas: Lista de exercícios 5

MDM,FRMP-2014

1. (a) $\frac{1 - az^{-1} \cos(\omega_o)}{1 - 2a \cos(\omega_o) z^{-1} + a^2 z^{-2}}, \quad \text{RC: } |z| > |a|$
(b) $\ln(2z + 1), \quad \text{RC: } |z| < \frac{1}{2}$
(c) $\frac{a^{-1} z^{-1}}{(1 - a^{-1} z^{-1})^2}, \quad \text{RC: } |z| > \frac{1}{|a|}$
(d) $\frac{1}{1 - \frac{1}{2} z^{-1}}, \quad \text{RC: } |z| > \frac{1}{2}$
(e) $\frac{1}{1 - \frac{1}{2} z^{-1}}, \quad \text{RC: } |z| < \frac{1}{2}$
(f) $\frac{1}{1 - 2z}, \quad \text{RC: } |z| < \frac{1}{2}$
(g) $z^{-1}, \quad \text{RC: } |z| > 0$
(h) $\frac{1 - \frac{1}{1024} z^{-10}}{1 - \frac{1}{2} z^{-1}}, \quad \text{RC: } |z| > 0$
2. (a) $Y(z) = \frac{z^{-3}}{z^2 + 4}$
(b) $Y(z) = \frac{2z}{z^2 + 16}$
(c) $Y(z) = \frac{z}{1 + 4z^2}$
(d) $Y(z) = \frac{z^3 - 4z}{(z^2 + 4)^2}$
3. (a) $x(n) = \delta(n) - 2(-2)^n u(-n) - \left(\frac{1}{2}\right)^n u(n-1)$
(b) $x(n) = 11\delta(n) + \left[8\left(\frac{1}{3}\right)^n + 3\left(\frac{1}{4}\right)^n\right] u(n-1)$
(c) $x(n) = \delta(n) + \delta(n-1) + \left[\left(-\frac{1}{2}\right)^n - 2(-1)^n\right] u(-n)$
(d) $x(n) = \sum_{k=5}^{10} \frac{1}{k} \delta(n-k)$
4. (a) $x(n) = -\frac{1}{n} \left(\frac{1}{2}\right)^n u(n-1)$
(b) $x(n) = \frac{1}{n!} u(n)$
5. (a) $h(n) = \delta(n) + \frac{1}{3} \left[\left(-\frac{1}{2}\right)^n + 8\right] u(n-1)$
(b) $y(n) = \frac{-4j}{3+j} e^{j\frac{\pi}{2}n}$

$$6. \ g(11) = -\frac{1}{11!} + \frac{3}{9!} - \frac{2}{7!}$$

$$7. \ (b) \ Y(z) = X(z^L), \quad \alpha^{\frac{1}{L}} < |z| < \beta^{\frac{1}{L}}$$