PTC2324: Processamento Digital de Sinais I

Respostas: Lista de exercícios 5

MDM,FRMP-2014

1. (a) $\dfrac{1 - az^{-1}\cos(\omega_o)}{1 - 2a\cos(\omega_o)z^{-1} + a^2 z^{-2}}$, RC: $|z| > |a|$

   (b) $\ln\left(z + \dfrac{1}{2}\right)$, RC: $|z| < \dfrac{1}{2}$

   (c) $\dfrac{a^{-1}z^{-1}}{(1 - a^{-1}z^{-1})^2}$, RC: $|z| > \dfrac{1}{|a|}$

   (d) $\dfrac{1}{1 - \frac{1}{2}z^{-1}}$, RC: $|z| > \dfrac{1}{2}$

   (e) $\dfrac{1}{1 - \frac{1}{2}z^{-1}}$, RC: $|z| < \dfrac{1}{2}$

   (f) $\dfrac{1}{1 - 2z}$, RC: $|z| < \dfrac{1}{2}$

   (g) z^{-1}, RC: $|z| > 0$

   (h) $\dfrac{1 - \frac{1}{1024}z^{-10}}{1 - \frac{1}{2}z^{-1}}$, RC: $|z| > 0$

2. (a) $Y(z) = \dfrac{z^{-3}}{z^2 + 4}$

   (b) $Y(z) = \dfrac{2z}{z^2 + 16}$

   (c) $Y(z) = \dfrac{z}{1 + 4z^2}$

   (d) $Y(z) = \dfrac{z^3 - 4z}{(z^2 + 4)^2}$

3. (a) $x(n) = \delta(n) + 4(-2)^{n-1}u(-n) - \left(\dfrac{1}{2}\right)^n u(n-1)$

   (b) $x(n) = 11\delta(n) + \left[8\left(\dfrac{1}{3}\right)^n + 3\left(\dfrac{1}{4}\right)^n\right]u(n-1)$

   (c) $x(n) = \delta(n) + \delta(n-1) + \left[\left(-\dfrac{1}{2}\right)^n - 2(-1)^n\right]u(-n)$

   (d) $x(n) = \displaystyle\sum_{k=5}^{10} \dfrac{1}{k}\delta(n-k)$

4. (a) $x(n) = -\dfrac{1}{n}\left(\dfrac{1}{2}\right)^n u(n-1)$

   (b) $x(n) = \dfrac{1}{n!}u(n)$

5. (a) $h(n) = \delta(n) + \dfrac{1}{3}\left[\left(-\dfrac{1}{2}\right)^n + 8\right]u(n-1)$

   (b) $y(n) = \dfrac{-4j}{3+j}e^{j\frac{\pi}{2}n}$

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

7.   (a) $Y(e^{j\omega}) = X(e^{j\omega L})$

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