

Discrete time systems and z-transform

Solutions Module 5 - No steps

- 1.a: $H(z) = \frac{-\frac{1}{7}z^{-1}}{1-\frac{1}{4}z^{-1}} + \frac{\frac{8}{7}z^{-1}}{1-2z^{-1}}$
- 1.b: $h[n] = -\frac{1}{7}(\frac{1}{4})^{n-1}u[n-1] - \frac{8}{7}(2)^{n-1}u[-n]$
- 2.a: $H(z) = \frac{1-2z^{-1}}{1-\frac{3}{4}z^{-1}}, |z| > \frac{3}{4}$
- 2.b: $h[n] = (\frac{3}{4})^n u[n] - 2(\frac{3}{4})^{n-1} u[n-1]$
- 2.c: $y[n] - \frac{3}{4}y[n-1] = x[n] - 2x[n-1]$
- 2.d: The system is stable and causal
- 3: $h[n] = \delta[n] - \delta[n-2]$
- 4: If $|z| > 3$, $h_i[n] = \frac{7}{9}\delta[n] - \frac{2}{3}\delta[n-1] + \frac{2}{9}(3)^n u[n]$;
if $|z| < 3$, $h_i[n] = \frac{7}{9}\delta[n] - \frac{2}{3}\delta[n-1] - \frac{2}{9}(3)^n u[-n-1]$
- 5: If $|z| > 4$, $h[n] = -14(\frac{1}{2})^n u[n] - 28(2)^n u[n] + 48(4)^n u[n]$;
if $2 < |z| < 4$, $h[n] = -14(\frac{1}{2})^n u[n] - 28(2)^n u[n] - 48(4)^n u[-n-1]$