

EE 554 – Homework Chapter 2

2.6 Use the linearity of the z-transform and the transform of the exponential function to obtain the transforms of the discrete-time functions.

(a) $\sin(k\omega T)$

(b) $\cos(k\omega T)$

2.8 Find the inverse transforms of the following functions using Definition 2.1 and, if necessary, long division.

(a) $F(z) = 1 + 3z^{-1} + 4z^{-2}$

(b) $F(z) = 5z^{-1} + 4z^{-5}$

(c) $F(z) = \frac{z}{z^2 + 0.3z + 0.02}$

(c) $F(z) = \frac{z - 0.1}{z^2 + 0.04z + 0.25}$

2.13 If the rational functions of Problems 2.8.(c) and (d) are transfer functions of LTI systems, find the difference equation governing each system.

2.17 Find the steady-state response of the systems resulting from the sinusoidal input $u(k) = 0.5\sin(0.4k)$

(a) $H(z) = \frac{z}{z - 0.4}$

(b) $H(z) = \frac{z}{z^2 + 0.4z + 0.03}$

2.20 Obtain the convolution of two sequences $\{1, 1, 1\}$ and $\{1, 2, 3\}$.

(a) Directly

(b) Using z-transform

2.26 Repeat Problem 2.25 for the second-order closed-loop system of Problem 2.23(b) with plots for sampling frequencies $\omega_s = k \omega_d$, where $k = 5, 35, 70$.