ENEL 484 Assignment #4

Q1 [25pts]

For the following function

$$E(z) = \frac{0.5z}{(z-1)(z-0.6)}$$

(a) Use initial value theory to find $e(0)$

(b) Use final value theory to find $e(\infty)$

(c) Use power series method to find $e(k)$

(d) Use partial fraction expansion method to find $e(k)$

Q2 [20pts]

For the following function

$$E(z) = \frac{0.5}{(z-1)(z-0.6)}$$

(a) Use power series method to find $e(k)$

(b) Use partial fraction expansion method to find $e(k)$

Q3 [10pts]

Find $e(t)$, when sampled at a rate of 10 Hz (T = 0.1 s), results in the transform

$$E(z) = \frac{2z}{z-0.8}$$

Q4 [15pts]

A signal $e(t)$ is sampled by the ideal sampler.

(a) List the conditions under which $e(t)$ can be completely recovered from $e^*(t)$, that is, the conditions under which no loss of information by the sampling process occurs.

(b) State which of the conditions listed in part (a) can occur in a physical system. Recall that the ideal sampler itself is not physically realizable.

(c) Considering the answers in part (b), state why we can successfully employ systems that use sampling.

Q5 [20pts]

(a) Explain why the stared transfer functions $E^*(s)$ are equal for the following two sets of signals. $e_1(t) = cos(4\pi t)$ and $e_2(t) = cos(16\pi t)$.

(b) Find a third time function has the same $E^*(s)$.

Q6 [10pts]

A sinusoid with a frequency of 2 Hz is applied to a sampler/zero-order hold combination. The sampling rate is 10 Hz. List all the frequencies present in the output that are less than 50 Hz.