

EECE 5610: Homework #2

Due on September 29, 2022 at 2:50pm

Homework should be submitted via Canvas before the beginning of the class. Late submission is not accepted.

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Problem 1

Find the z -transforms of the number sequences generated by sampling the following time functions every T seconds, beginning at $t = 0$. Express these transforms in closed form.

(a) $e(t) = \exp(-at)$

(b) $e(t) = \exp(-t + T)u(t - T)$

(c) $e(t) = \exp(-t + 5T)u(t - 5T)$

Hint: Note $u(t)$ is the unit step function and $\exp(x) = e^x$ is the exponential function. First, you need to obtain associated discrete functions ($e[k] = e(Tk)$), and then you need to use the properties of the z -transform that we discussed in the class.

Problem 2**Problem 2.4-2**

A function $e(t)$ is sampled, and the resultant sequence has the z -transform

$$E(z) = \frac{z - b}{z^3 - cz^2 + d}$$

Find the z -transform of $\exp(akT)e(kT)$.

Hint: Solve this problem using $E(z)$ and the properties of the z -transform.

Problem 3**Problem 2.7-2**

For the number sequence $\{e(k)\}$,

$$E(z) = \frac{z}{(z-1)^2},$$

- (a) Apply the final-value theorem to $E(z)$.
- (b) Find the z -transform of $e(k) = k(-1)^k$.
- (c) Explain how parts(a) and (b) are related?