



Course: Computer-Controlled Systems (CSE422)

Sheet No.: 3

Date: 4/3/2018

Due: 7/3/2018

Time: 2 Hours

Problems:

1. Obtain the Z-transform for the following functions:

$$(a) x(t) = \begin{cases} 1, & t \geq 0 \\ 0, & t < 0 \end{cases}$$

$$(b) x(t) = \begin{cases} t, & t \geq 0 \\ 0, & t < 0 \end{cases}$$

$$(c) x(t) = \begin{cases} a^k, & k = 0, 1, 2, \dots \\ 0, & k < 0 \end{cases}$$

$$(d) x(t) = \begin{cases} e^{-at}, & t \geq 0 \\ 0, & t < 0 \end{cases}$$

$$(e) X(s) = \frac{1}{s(s+1)}$$

$$(f) x(k) = k^2$$

2. Obtain the inverse Z-transform for the following functions:

$$(a) X(z) = \frac{(1-e^{-aT})z}{(z-1)(z-e^{-aT})}$$

$$(b) X(z) = \frac{2z^3+2}{(z-2)^2(z-1)}$$

3. Convert the following controller discrete transfer function into pseudocode. Assume that $u(k)$ is the controller action, and $e(K)$ is the computed error:

$$\frac{U(z)}{E(z)} = \frac{z-1}{z+1}$$

Homework:

4. For the following signal shown in Figure 1, calculate the z-transform of $x(t)$ assuming that the sampling time is 1 sec.

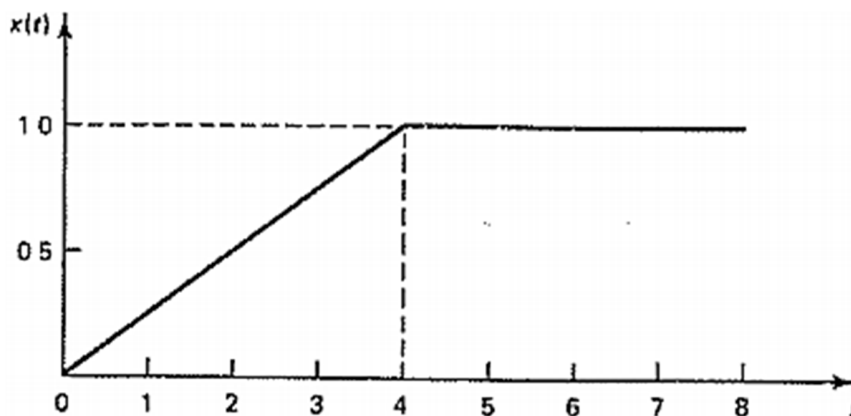


Figure 1

