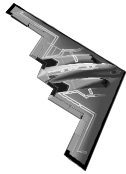


O K L A H O M A S T A T E U N I V E R S I T Y
S C H O O L O F E L E C T R I C A L A N D C O M P U T E R E N G I N E E R I N G



ECEN 3723 Systems I
Spring 1999
Midterm Exam #2



Name : _____

Student ID: _____

E-Mail Address: _____

Problem 1:

Proof

a) $Z[x^*(k)] = X^*(z^*)$

b) $Z[\operatorname{Re} x(k)] = \frac{1}{2}(X(z) + X^*(z^*))$

Problem 2:

a) Determine the \mathbf{Z} -transform of

$$-\left(\frac{1}{2}\right)^k u(-k-1)$$

b) The autocorrelation sequence $c(k)$ of a sequence $x(k)$ is defined as

$$c(k) = \sum_{i=-\infty}^{\infty} x(i)x(k+i).$$

Determine the \mathbf{Z} -transform of $c(k)$ in terms of the \mathbf{Z} -transform of $x(k)$.

Problem 3:

Given

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

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

find Z^{-1} -transform, $x(k)$.

Problem 4:

Solve the following difference equation

$$x(k+1) = x(k) + a^k$$

where $x(0) = 0$.