

# EE206 Assignment 10 \*

Due 20<sup>th</sup> Dec.

1. Find the Z transform of the following sequence  $\{x_k\}_{k \geq 0}$

(a)  $x_k = (-1)^k$

(b)  $x_k = 3k + (-4)^{2k+1}$

2. Find the inverse Z transform of

(a)  $F(z) = \frac{z^2}{(z+1)(z+2)(z+3)}$

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

3. Find the 'final' value (limit) of the sequence  $\{x_k\}$  with Z transform:

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

4. What is the initial value of the sequence whose Z transform is given by:

(a)  $F(z) = \frac{2z^2 - z + 1}{5 - 3z - 7z^2}$

(b)  $F(z) = \frac{2z^3 + 5z^2 + 2z - 1}{6z^3 - 4z + 2}$

5. Write out the first five terms in the sequence which satisfies the following conditions:

(a)  $x_{k+2} = 2x_k + x_{k+1}, \quad x_0 = 2, \quad x_1 = 5$

(b)  $x_{k+2} = 3x_k - 2x_{k+1}, \quad x_0 = 1, \quad x_1 = 1$

6. Find the Z transform of the following sequence

(a)  $\{0, 1, 0, 1, 0, 1, \dots\}$

(b)  $\{2, 0, 4, 0, 8, 0, 16, \dots\}$

(c)  $\{1, 1, 2, 3, 5, 8, \dots\}$

7. Solve the following recurrence relation

(a)  $x_{k+2} - 4x_{k+1} + 4x_k = 3$  where  $x_0 = 1, \quad x_1 = 0$

(b)  $x_{k+2} + 5x_{k+1} + 6x_k = 2^{k+2}$  where  $x_0 = 0, \quad x_1 = 2$

(c)  $x_{k+2} - 9x_k = 2k$  where  $x_0 = 1, \quad x_1 = 1$

8. Find the Z transform of the sequence of values obtained when  $f(t)$  is sampled at regular intervals of  $t = T$  where

(a)  $f(t) = \sin(t)$

(b)  $f(t) = \sinh(t)$

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