University of Victoria
Department of Electrical and Computer Engineering
ELEC 310-Spring 2010
Assignment 3 worth 3% of final course mark

Issued: February 26 **Due: March 5 4:00 pm**
Please use the ELEC 310 drop box by the ELW 2nd floor elevator

Problem 1.

Determine the algebraic expression of the Z-transform, as well as its region of convergence for each of the following sequences:

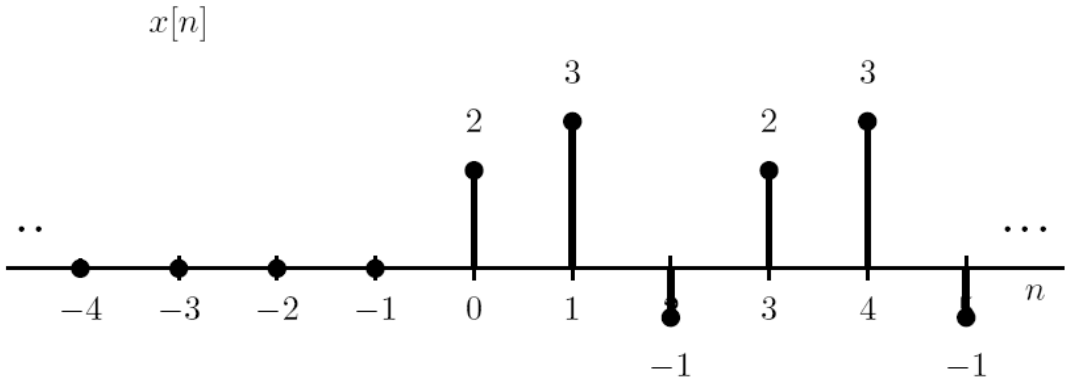
$a)\ x[n] = 2\delta[n+3] + \delta[n-2]$

$b)\ x[n] = 2^n u[n-1] + 4^n u[-n]$

For each sequence, specify whether its Fourier transform exists or not.

Problem 2.

Find the z-transform $X(z)$ and the associated ROC of the signal $x[n]$, where $x[n]$ is a semi-periodic signal that satisfies the following conditions:
• $x[n] = 0$ for $n < 0$.
• $x[0] = 2$.
• $x[1] = 3$.
• $x[2] = -1$.
• $x[n] = x[n-3]$ for $n > 2$.



Problem 3.

For each of the following Z-transforms, determine the inverse Z-transform (i.e. x[n])

$a)\ X(z) = 12z^{-4} - z^{-1} + 6 + 9z^{2} - 8z^{5}$

$b)\ X(z) = \dfrac{5}{1 + \frac{1}{6}z^{-1} - \frac{1}{6}z^{-2}} \qquad \frac{1}{3} < |z| < \frac{1}{2}$

Problem 4.

Consider a signal y[n] which is related to signals $x_1[n]$ and $x_2[n]$ as follows:

$$y[n] = x_1[-n] * x_2[n+4]$$

where

$$x_1[n] = \left(-\frac{1}{2}\right)^n u[n] \text{ and } x_2[n] = \left(\frac{1}{4}\right)^n u[n]$$

Determine the Z-transform of y[n], together with its ROC.

Problem 5.

Question 3.21 (textbook) except d).