Homework No. 9
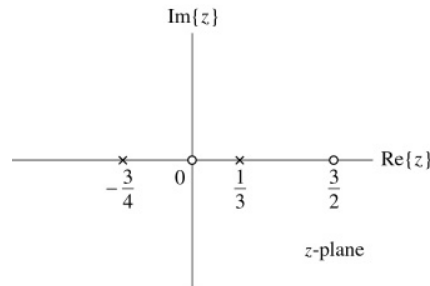## Due 10:10 am, June 20, 2006

7.17 Determine the z-transform and sketch the poles, zeros, and ROC in the z-plane for the following time signals:

(c) $x[n] = u[n]$

(d) $x[n] = \left(\dfrac{1}{4}\right)^n \left(u[n] - u[n-5]\right)$

7.19 The location of the poles and zeros of $X(z)$ is depicted in the z-plane in the following figure:

In the case, identify the valid ROC for $X(z)$, and specify whether the time signal corresponding to the ROC, is right sided, left sided or two-sided.

7.24 Use the method of partial fractions to obtain the time-domain signals corresponding to the following z-transforms:

(a) $X(z) = \dfrac{1 + \dfrac{7}{6}z^{-1}}{\left(1 - \dfrac{1}{2}z^{-1}\right)\left(1 + \dfrac{1}{3}z^{-1}\right)}, \quad |z| > \dfrac{1}{2}$

(d) $X(z) = \dfrac{z^2 - 3z}{z^2 + \dfrac{3}{2}z - 1}, \quad \dfrac{1}{2} < |z| < 2$

7.28 Use a power series expansion to determine the time-domain signals corresponding to the following z-transforms:

(c) $X(z) = \cos\left(z^{-3}\right), \quad |z| > 0$

(d) $X(z) = \ln\left(1 + z^{-1}\right), \quad |z| > 0$

Problem 1. With the given system function

$$H(z) = \dfrac{1 - 2z^{-1}}{1 - \dfrac{1}{3}z^{-1}}, \quad |z| > \dfrac{1}{3},$$

does there exist a both causal and stable inverse system for the given one? Why?