Homework No.6

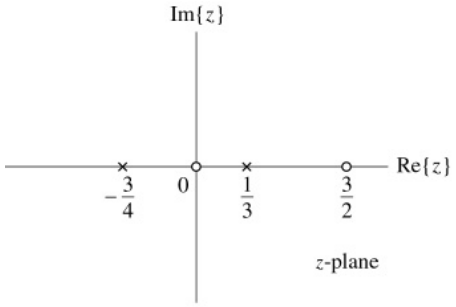
Due Jan. 11, 2011 (Submit to Lab721)

1 Determine the z-transform and sketch the poles, zeros, and ROC in the z-plane for the following time signals: (20%)

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

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

2 The location of the poles and zeros of $X(z)$ is depicted in the z-plane in the following figure: (18%)



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.

3 Use the method of partial fractions to obtain the time-domain signals corresponding to the following z-transforms: (26%)

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

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

4 Use a power series expansion to determine the time-domain signals corresponding to the following z-transforms: (20%)

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

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

5 With the given system function (16%)

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

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