Homework No. 8

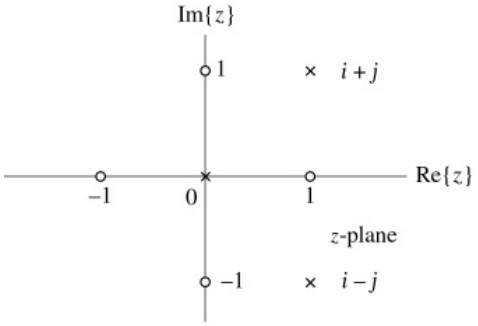
Due 10:10 am, June 14, 2007

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

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

(f) $x[n]=3^n u[-n-1]$

7.19 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.

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

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

(g) $X(z)=\dfrac{2z^4-2z^3-2z^2}{z^2-1}, \quad |z|>1$

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

(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

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

does there exist a both causal and stable inverse system for the given one? Why? (16%)