Serial #

- 1 points for not writing your serial number

King Fahd University of Petroleum & Minerals
Electrical Engineering Department
EE207: Signals and Systems (111)
Quiz 6: Sampling and Z Transform
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Name: Key Sec.

Assume we have an analogue signal, $y(t)$=sin 0.1 πt + cos0.4 πt.

What is the maximum frequency in the signal? (1 point)

Frequency of first term 0.05Hz and it is 0.2Hz for the second term , Max freq=0.2 Hz

What is the minimum sampling frequency so the signal can be reconstructed correctly? (1 point)

Nyquist rate=2*0.2=0.4 Hz.

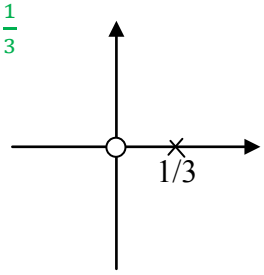
If the above signal is sampled at a rate of f_s=10 samples per second. How do we reconstruct the signal (mention all characteristics of the filter)? (2 points)

Using a low-pass filter with bandwidth =f_s/2=5 Hz and magnitude =1/f_s=0.1.
Notice that the bandwidth of the filter if ideal can be anything >0.2HZ and <10-0.2=9.8Hz

Find the z-transform for the following sequence, ROC, and sketch the pole zero plot. (3 points)

$$x(nT) = \left(\frac{1}{3}\right)^n u(n)$$

$$X(z) = \frac{1}{1-\left(\frac{1}{3}Z^{-1}\right)} = \frac{z}{z-\frac{1}{3}}, \text{ ROC } \left|\frac{1}{3}z^{-1}\right| < 1 \text{ . which means } |z^{-1}| < 3 \text{ or } z > \frac{1}{3}$$



Find the z-transform for the following sequence (3 points)

(b) $x(nT) = u(n) + \left(\frac{3}{4}\right)^n u(n-8)$

$$x(nT) = u(n) + \left(\frac{3}{4}\right)^8 \left(\frac{3}{4}\right)^{n-8} u(n-8)$$

$$X(z) = \frac{1}{1-Z^{-1}} + \left(\frac{3}{4}\right)^8 z^{-8} \frac{1}{1-\left(\frac{3}{4}\right)Z^{-1}}$$

Good Luck, **Dr. Ali Muqaibel**