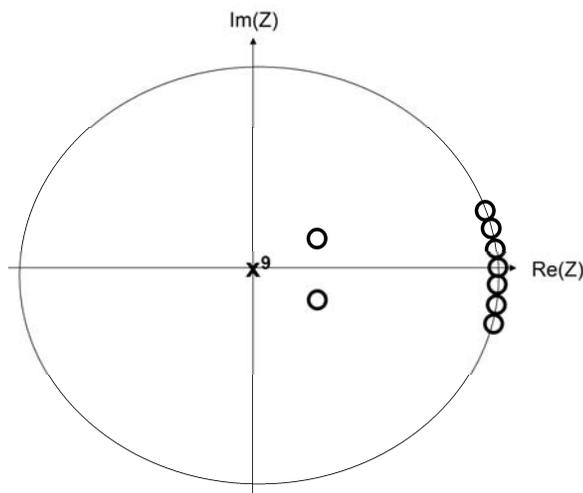
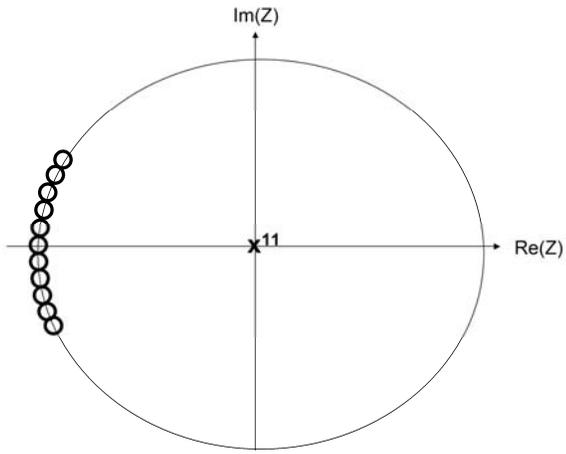


**EE432 Fall 2008 PS09 (Due: Wed 11/26/08)**

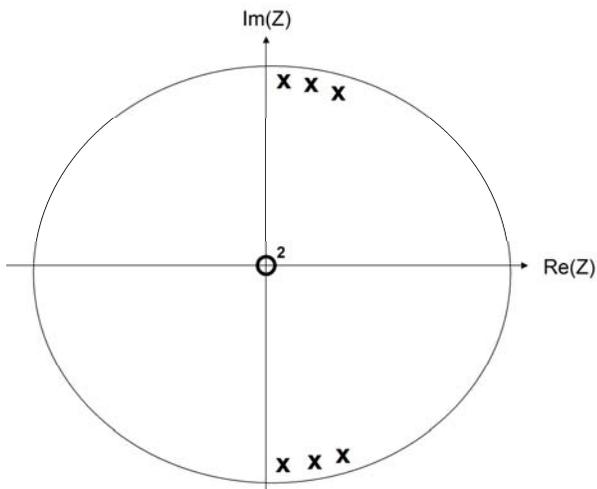
1. Find the transfer functions of the following systems. (i.e., find the Z-transforms of the impulse responses for the following systems).
  - a.  $y[n] = \frac{1}{3}(x[n] + x[n-1] + x[n-2])$ .
  - b.  $y[n] = x[n-1] - 0.4y[n-1]$ .
  - c.  $y[n] = x[n] - 5y[n-1]$ .
  - d.  $y[n] + 0.8y[n-1] + 0.25y[n-2] = x[n] + x[n-2]$ .
  
2. For the systems from question 1, plot the poles, zeros and ROCs, and is the system stable?
  
3. For the causal system pole zero plots that follow, classify the systems as to the following. Note that the unit circle is plotted on the Z-plane for each pole-zero plot.
  - a. FIR or IIR? Why?
  - b. Stable or not stable? Why?
  - c. HPF or LPF or BPF or BRF? Why?
  - d. For each filter, the sample frequency of an input signal is provided. Give an educated guess of the range of frequencies that are passed for low pass, high pass and band pass filters, or the range of frequencies (in Hz) that are rejected for a band reject filter.



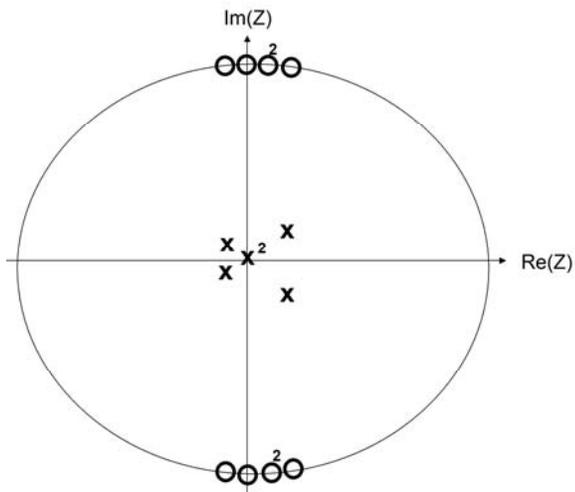
System A:  $f_s = 100$  kHz



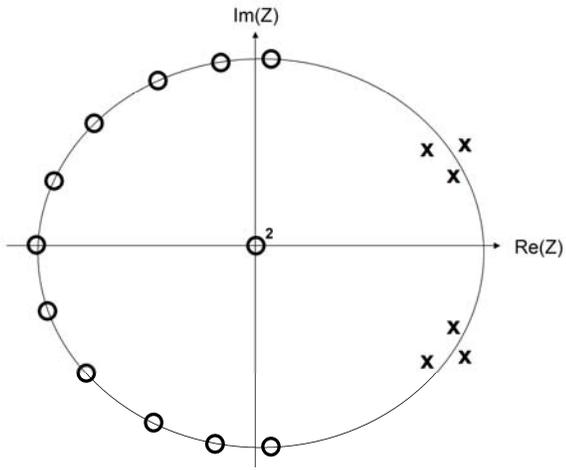
System B:  $f_s = 44.1$  kHz



System C:  $f_s = 8$  kHz



System D:  $f_s = 20$  kHz



System E:  $f_s = 192$  kHz