## **PROBLEM:**

Consider the following cascade system:

$$\begin{array}{c|c} x[n] & LTI \\ System \#1 \\ H_1(z) & W(z) \end{array} \begin{array}{c} UTI \\ System \#2 \\ H_2(z) & Y(z) \end{array}$$

It is known that

$$H(z) = (1 - z^{-2})(1 - 0.8e^{j\pi/4}z^{-1})(1 - 0.8e^{-j\pi/4}z^{-1})(1 + z^{-2})$$

(a) Determine the poles and zeros of H(z) and plot them in the complex *z*-plane.

- (b) It is possible to determine two possible system functions  $H_1(z)$  and  $H_2(z)$  so that: (1) the overall cascade system has the given system function H(z) and (2) w[n] = x[n] x[n-4]. Find  $H_1(z)$  and  $H_2(z)$ .
- (c) Determine the difference equation that relates y[n] to w[n] for your answer in part (b).