5.23 Consider the following IIR system.

$$H(z) = \frac{2(z^2+0.64)(z^2-z+0.24)}{(z^2+1.2z+0.27)(z^2+0.81)}$$

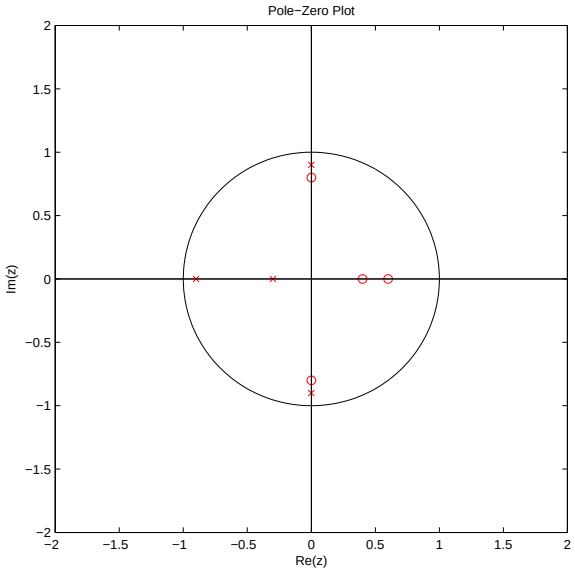
(a) Sketch the poles and zeros of $H(z)$.

(b) Sketch a cascade form signal flow graph realization by grouping the complex zeros with the complex poles. Use a direct form II realization for each block.

Solution

(a) The fully factored form of $H(z)$ is

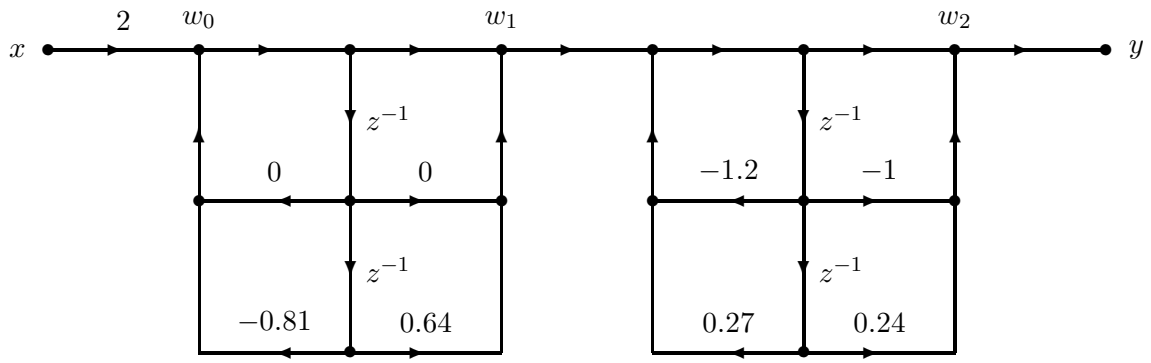
$$H(z) = \frac{2(z+j0.8)(z-j0.8)(z-0.6)(z-0.4)}{(z+0.9)(z+0.3)(z+j0.9)(z-j0.9)}$$



Poles and Zeros of $H(z)$

(b) Using (5.6.17) we have

$$\begin{aligned} b_0 &= 2 \\ H_1(z) &= \frac{z^2+0.64}{z^2+0.81} \\ H_2(z) &= \frac{z^2-z+0.24}{z^2+1.2z-0.27} \end{aligned}$$



Signal Flow Graph of Casecade Form Realization