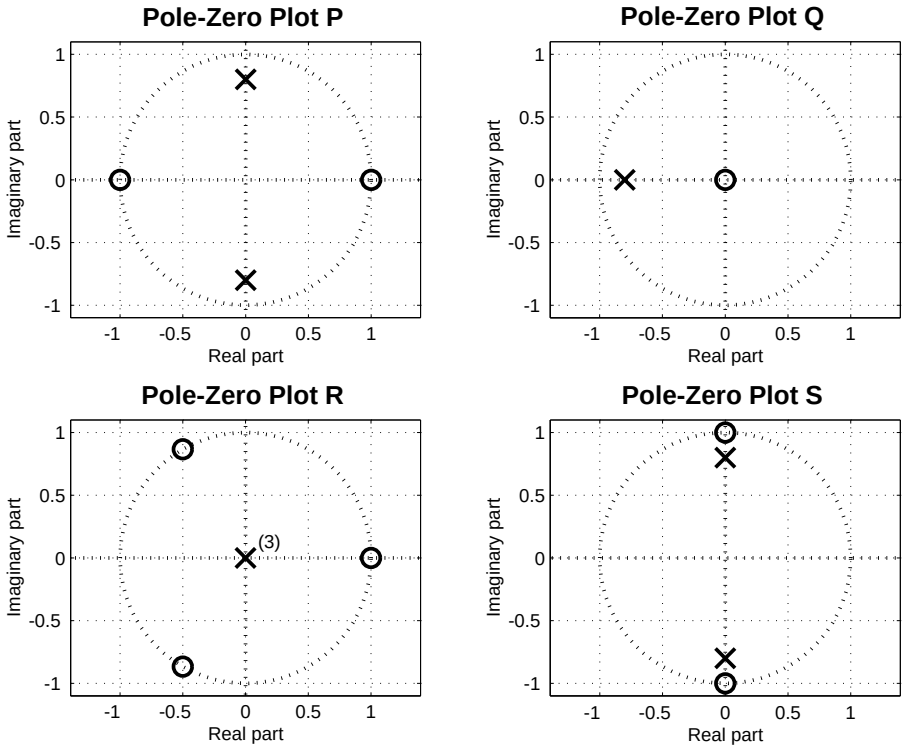
PROBLEM:



For each of the pole-zero plots (P, Q, R, S), determine which one of the following systems (specified by either an impulse response $h[n]$, a difference equation, or a MATLAB statement) matches the pole-zero plot. *There is only ONE correct match per plot.*

$\mathcal{S}_1$: $h[n] = \delta[n] + 0.8\delta[n-1]$

$\mathcal{S}_2$: $h[n] = (-0.8)^n u[n]$

$\mathcal{S}_3$: $y[n] = -0.64y[n-2] + x[n] + x[n-2]$

$\mathcal{S}_4$: $y[n] = x[n] - x[n-3]$

$\mathcal{S}_5$: y=filter([1,1,1,1],1,x)

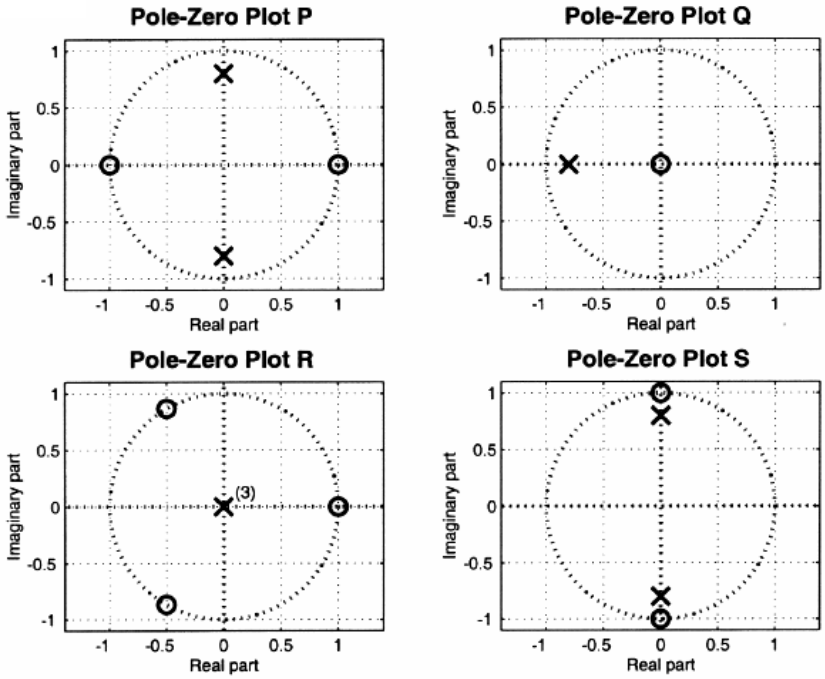
$\mathcal{S}_6$: $y[n] = -0.64y[n-2] + x[n] - x[n-2]$

$\mathcal{S}_7$: $h[n] = (-0.8)^n u[n] - (0.8)^n u[n]$

Mark your answer in the following table:

POLE-ZERO PLOT	SYSTEM ($\mathcal{S}_\#$)	POLE-ZERO PLOT	SYSTEM ($\mathcal{S}_\#$)
P		Q	
R		S	

SOLUTION



For each of the pole-zero plots (P, Q, R, S), determine which one of the following systems (specified by either an impulse response $h[n]$, a difference equation, or a MATLAB statement) matches the pole-zero plot. *There is only ONE correct match per plot.*

$\mathcal{S}_1$: $h[n] = \delta[n] + 0.8\delta[n-1]$

$\mathcal{S}_2$: $h[n] = (-0.8)^n u[n]$ → $H(z) = \frac{1}{1+.8z^{-1}}$ pole @ −0.8

$\mathcal{S}_3$: $y[n] = -0.64y[n-2] + x[n] + x[n-2]$

$\mathcal{S}_4$: $y[n] = x[n] - x[n-3]$ $H(z) = 1 - z^{-3}$ has zeros at $z = 1, e^{\pm j2\pi/3}$

$\mathcal{S}_5$: y=filter([1,1,1,1],1,x)

$\mathcal{S}_6$: $y[n] = -0.64y[n-2] + x[n] - x[n-2]$

$\mathcal{S}_7$: $h[n] = (-0.8)^n u[n] - (0.8)^n u[n]$

Mark your answer in the following table:

POLE-ZERO PLOT	SYSTEM ($\mathcal{S}_\#$)	POLE-ZERO PLOT	SYSTEM ($\mathcal{S}_\#$)
P	$\mathcal{S}_6$ 6	Q	$\mathcal{S}_2$ 2
R	$\mathcal{S}_4$ 4	S	$\mathcal{S}_3$ 3

$H(z) = \frac{1+z^{-2}}{1+0.64z^{-2}}$

zeros @ $z = \pm j$

poles @ $z = \pm j0.8$

$H(z) = \frac{1-z^{-2}}{1+0.64z^{-2}}$

zeros @ $z = \pm 1$

poles @ $z = \pm j0.8$