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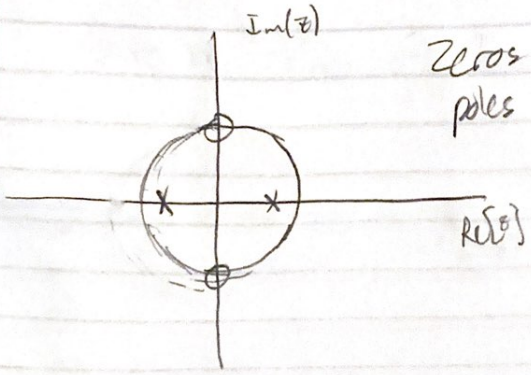
Prelab 4

1) $F = \frac{2048}{8142} = 0.25 \frac{\text{cycles}}{\text{second}} \rightarrow \theta = 2\pi(0.25) = \frac{\pi}{2}$



zeros: $e^{\pm j\frac{\pi}{2}}$

poles: ± 0.8

2) $H(z) = G\frac{\left(z - e^{\left(j\frac{\pi}{2}\right)}\right)\left(z - e^{\left(-j\frac{\pi}{2}\right)}\right)}{(z-0.8)(z+0.8)}$

$G\frac{z^2 - z\left(e^{-j\frac{\pi}{2}} + e^{j\frac{\pi}{2}}\right) + 1}{(z^2 - 0.64)}$ $\rightarrow 2\cos\frac{\pi}{2} \Rightarrow 0$

$G\frac{z^2+1}{z^2-0.64}$

$H(e^{j\theta})\Big|_{\theta=0} = 1 \rightarrow G\frac{(e^{j0}+1)}{(e^{j0}-0.64)} = 1$

$G\frac{2}{0.36} = 1$

$G = 0.18 \Rightarrow \boxed{H(z) = 0.18\frac{(z^2+1)}{(z^2-0.64)}}$

3) $\frac{0.18 + 0.18z^{-2}}{1 - 0.64z^{-2}}$ ←

$y(n) - 0.64y(n-2) = 0.18(x(n) - x(n-2))$