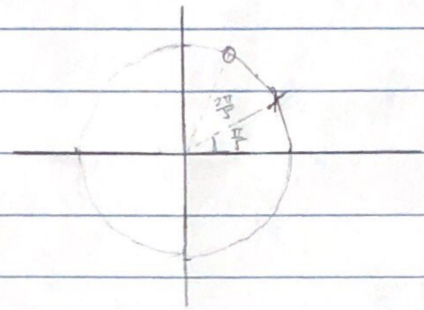
1 a)



poles : $\frac{\pi}{5}$ $\quad e^{(j\frac{\pi}{5})}$

zeros : $\frac{2\pi}{5}$ $\quad e^{(j\frac{2\pi}{5})}$

b)

c) Not linear phase, because only one zero.

d) Yes, because poles and zeros are inside the unit circle

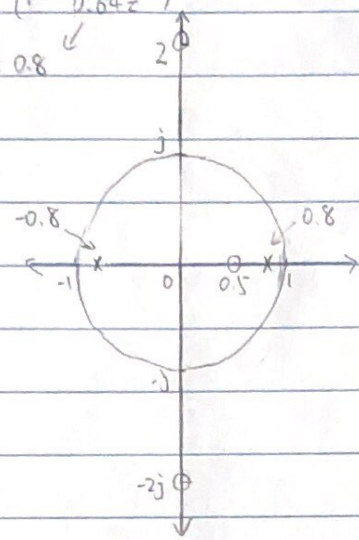
e) Not all pass, because poles and zeros do not occur in conjugate pairs

f) Not minimum phase, because pole and zero lie on the unit circle

0.5 ±2j

2. a) $H(z) = \frac{(1-0.5z^{-1})(1+4z^{-2})}{(1-0.64z^{-2})}$

±0.8



b) $H(z) = \frac{(1-0.5z^{-1})(1+4z^{-2})}{1-0.64z^{-2}} = \frac{1+4z^{-2}-0.5z^{-1}-2z^{-3}}{1-0.64z^{-2}} = \frac{Y(z)}{X(z)}$

$\therefore Y(z)(1-0.64z^{-2}) = X(z)(1-0.5z^{-1}+4z^{-2}-2z^{-3})$

$y[n]-0.64\,y[n-2] = x[n]-0.5\,x[n-1]+4x[n-2]-2\,x[n-3]$

$\therefore y[n] = 0.64\,y[n-2]+x[n]-0.5\,x[n-1]+4x[n-2]-2x[n-3]$

c) $H(z) = \frac{1-0.5z^{-1}}{1-0.64z^{-2}} \cdot (1+4z^{-2})$

$= \underbrace{\frac{(1-0.5z^{-1})(1+\frac{1}{4}z^{-2})}{(1-0.64z^{-2})}}_{H_1(z)} \cdot \underbrace{\left(\frac{1+4z^{-2}}{1+\frac{1}{4}z^{-2}}\right)}_{H_{ap}(z)}$