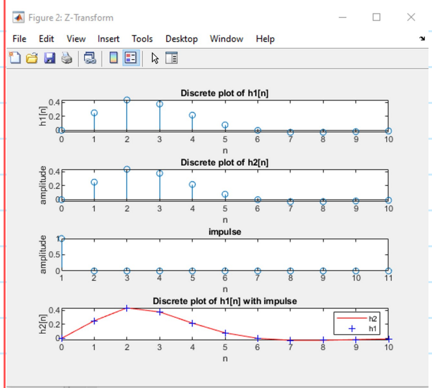
Lab3

October 27, 2020 1:03 AM



Q1 a) h1 is plotted above on first row

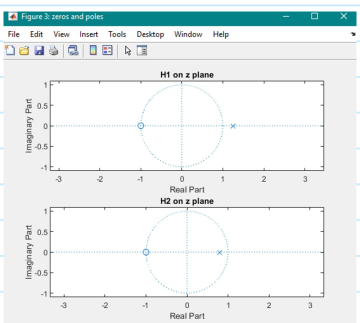
b) $h(n) = n(0.5)^n \sin\left(\frac{\pi n}{6}\right)u(n)$

using the ztrans function in Matlab,

we get $\dfrac{z(4z^2-1)}{(4z^2-2\sqrt{3}z+1)^2} = \dfrac{\cancel{z^4}(4z^{-1}-z^{-3})}{\cancel{z^4}(16-16\sqrt{3}z^{-1}+20z^{-2}-4\sqrt{3}z^{-3}+z^{-4})} = \dfrac{N(z^{-1})}{D(z^{-1})}$

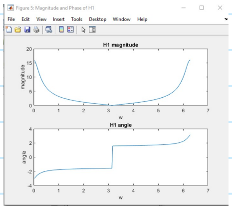
c) h_2 is plotted above on row 2 and is the impulse of h_1.

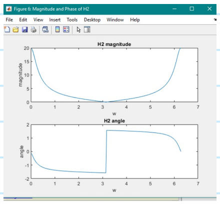
d) n is plotted, and the comparison of h_1 and h_2 are plotted

Q2 a) 

For the stability of h_1, the pole is on the outside of the unit circle, thus it does not converge, or otherwise is not stable

For the stability of h_2, the pole is on the inside of the unit circle, thus it does converge, or otherwis it is stable b)

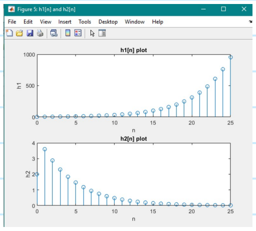




using Matlab to find angle and magnitude.

c) $H_1(z) = \dfrac{2+2z^{-1}}{1-1.25z^{-1}} = \dfrac{2z}{z-1.25} + \dfrac{2z\, z^{-1}}{z-1.25}$ $\quad h_1(n) = 2 \cdot 1.25^{n} u(n) + 2 \cdot 1.25^{n-1} u(n-1)$

$H_2(z) = \dfrac{2+2z^{-1}}{1-0.8z^{-1}} = \dfrac{2z}{z-0.8} + \dfrac{2z\, z^{-1}}{z-0.8}$ $\quad h_2(n) = 2 \cdot 0.8^{n} u(n) + 2 \cdot 0.8^{n-1} u(n-1)$



h_1 compared to h_2, h_1 goes to infinity, h_2 goes to 0.
thus h_1 is not bounded while h_2 is bounded.