3.1.2) output for sinusoid $\omega_c = .2\pi\ (2\pi)$ is

A) $y[n] = 1.58\ (.46\pi n + .78\pi)$

This signal is attenuated by .1392 factor and is shifted around 1.5 times of the circle.

B) Because the Phase slope is $\phi - 4\pi$

$\Rightarrow$ actual Phase $\phi / .46\pi = 7 \Rightarrow n_0 = 7$

c) Amplitude is .217

3.2 a) $\delta_p = |\,|H(e^{j\omega})| - 1\,| \Rightarrow \omega_p = .2207\pi$

b) $\omega_s = .2793\pi$

c) $\omega_p = .14844\,\pi$

D) $\omega_s = .3515\,6\pi$

e) for Rectangular filters yes

for Hamming filters yes

3.3 a) Rect $.0586\pi = \Delta\omega$

Hamming $.2274\,\pi < \Delta\omega$

B) This is true. Refer to Part A as the Rect. filter has more Ripples

C) $\omega_p = .44922\pi$

$\omega_s = .54883\pi$

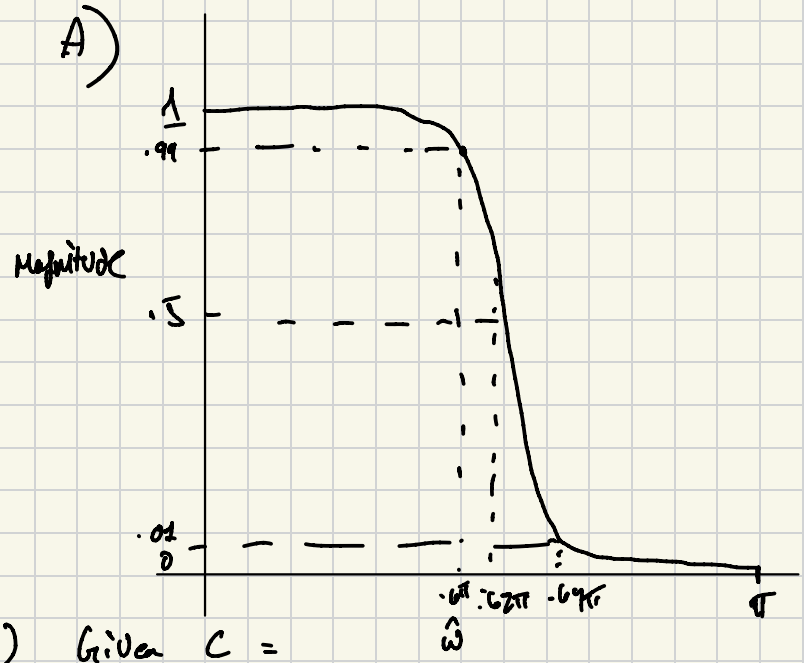
$\Delta\omega = .0996\,\pi$

D) When the order doubles $\Rightarrow \Delta\omega$ is $\sim 2X$

$\Delta\omega_1(30) \simeq \Delta\omega_2(60)$

$C = 5.9766$

3.4 A)



B) Given $C = 5.9766$

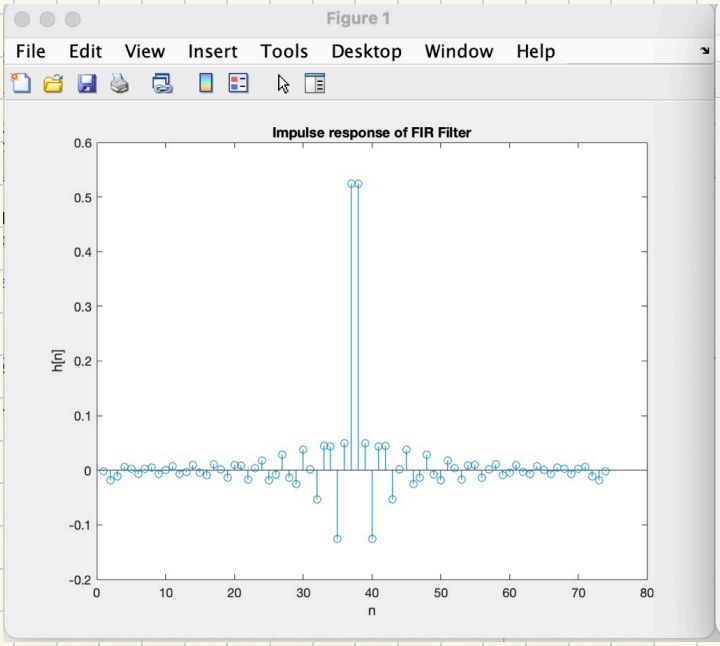
$\Delta w = .04 = \frac{C}{L}$ $\quad \frac{5.9766}{.04} = 149.4150$

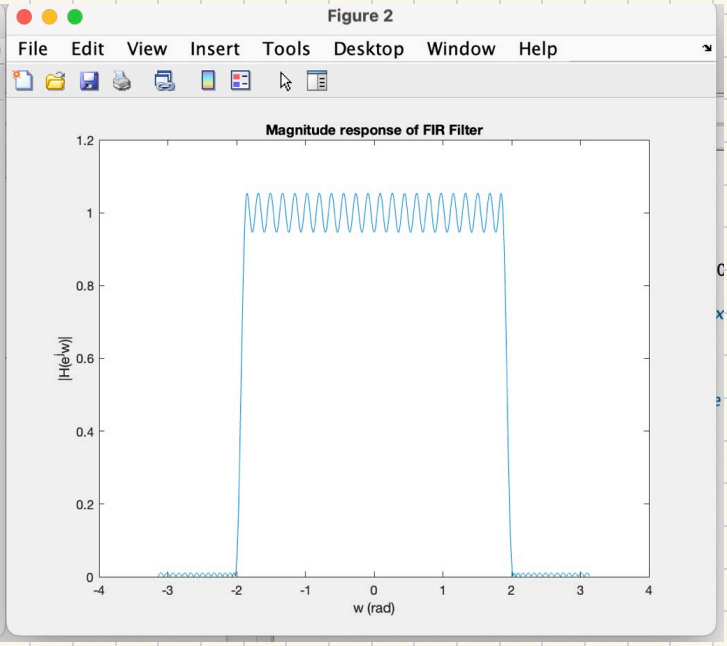
C) $w_{co} = .62\pi$

3.5) A) $2\pi \frac{f_c}{f_s}$ let $f_s = 10\,000$ Hz

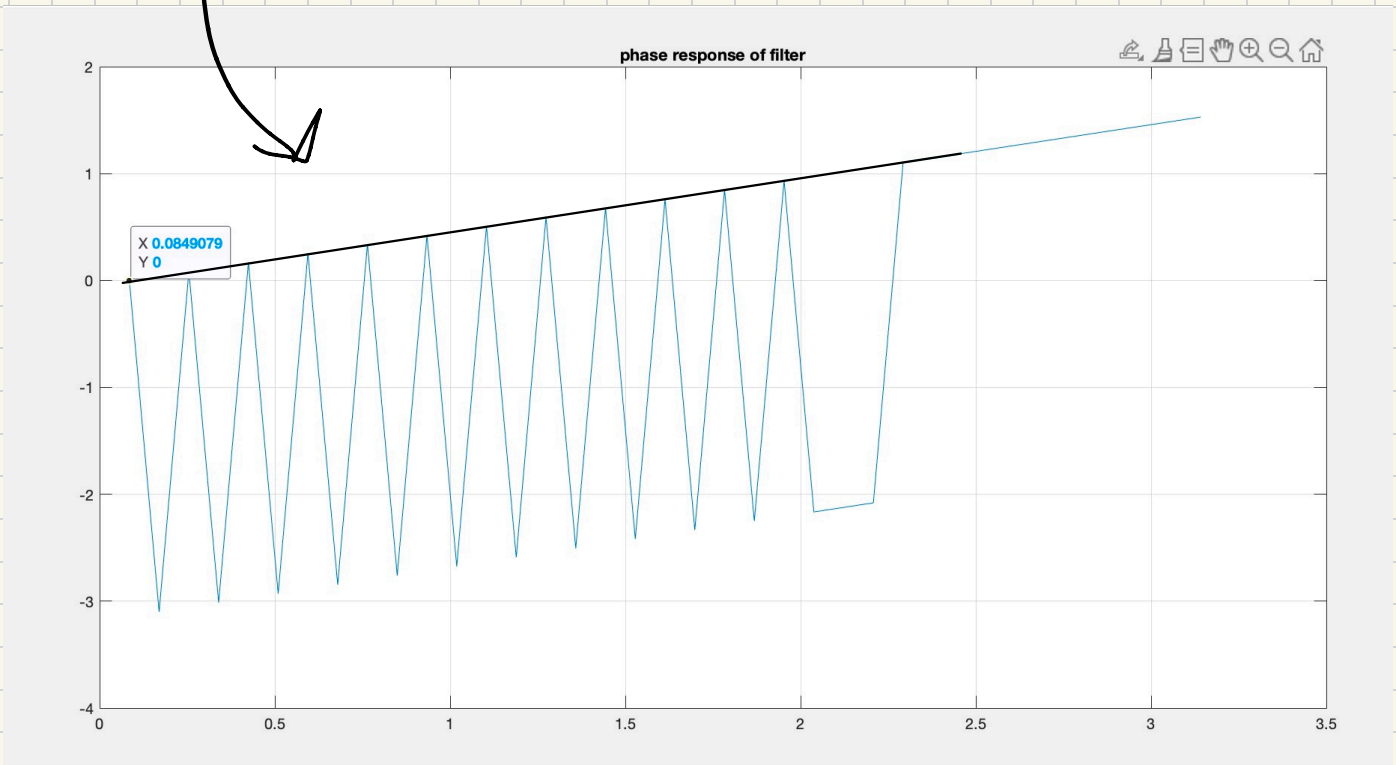
$f_p = 3000$ Hz

$f_s = 3200$ Hz





e) slope = .4865



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