PROBLEM:

FREQ RESPONSE: A

FREQ RESPONSE: B
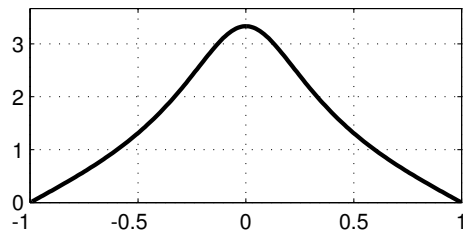
FREQ RESPONSE: C
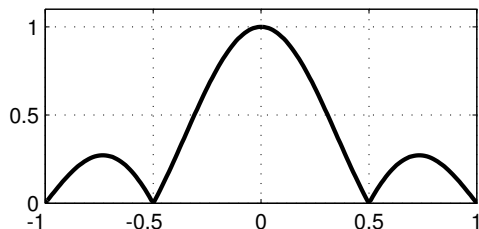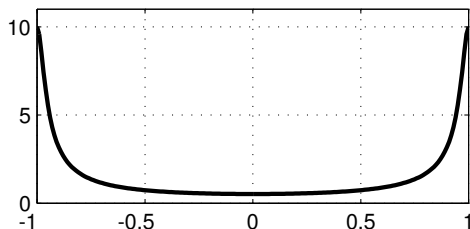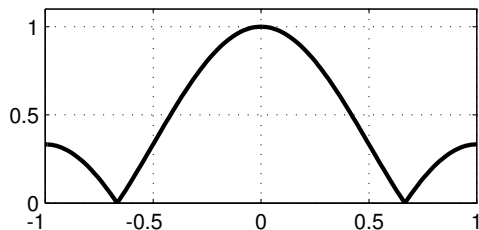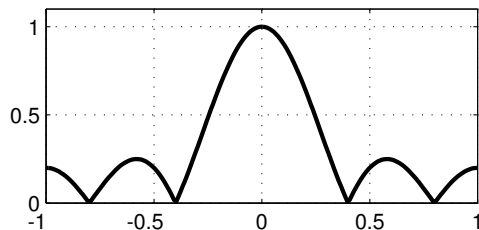
FREQ RESPONSE: D

FREQ RESPONSE: E

FREQ RESPONSE: F

FREQUENCY (ω/π)

For each of the systems below (specified by either an $H(z)$ or a difference equation), derive the frequency response formula and then determine which of the magnitude plots (A, B, C, D, E, F), matches each system. NOTE: frequency axis is normalized; it is $\hat{\omega}/\pi$.

$$\mathcal{S}_1: \quad H(z) = \tfrac{1}{3}(1 + z^{-1} + z^{-2})$$

$$\mathcal{S}_2: \quad H(z) = \frac{1 - z^{-5}}{5(1 - z^{-1})}$$

$$\mathcal{S}_3: \quad y[n] = 0.4y[n-1] + x[n] + x[n-1]$$

$$\mathcal{S}_4: \quad H(z) = \frac{z^{-1}}{1 + 0.9z^{-1}}$$