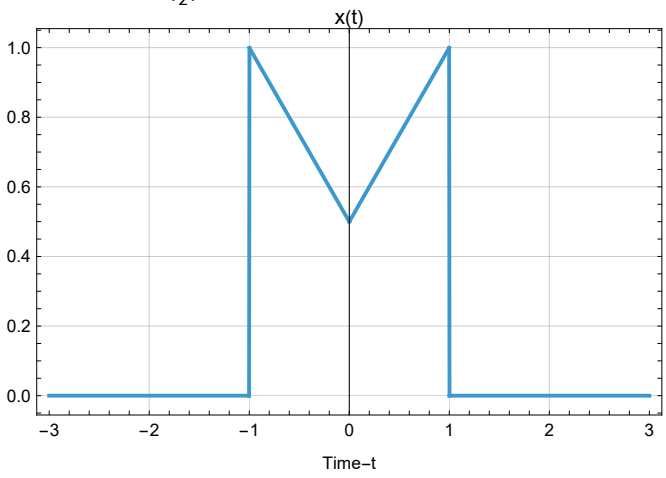
EECS 361

Concept Question #11

1. Given x(t) = rect($\frac{t}{2}$) - 0.5tri(t) find the Fourier transform of x(t), X(ω).



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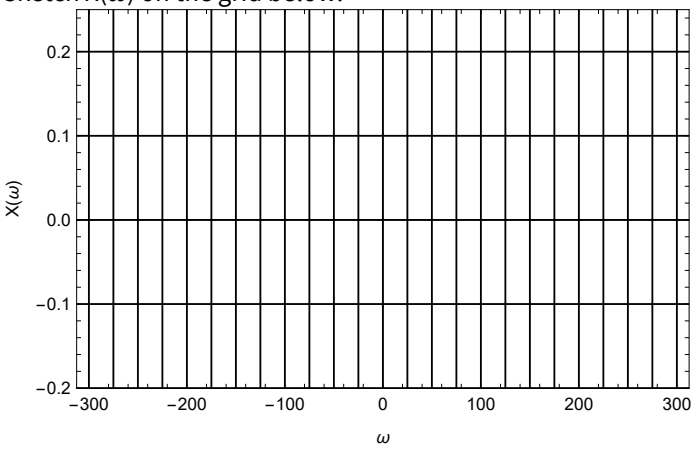
Concept Question #12

1. Given x(t) = rect$\left(\frac{t}{0.25}\right)$ cos(200t) find the Fourier transform of x(t), X(ω).

Sketch X(ω) on the grid below.



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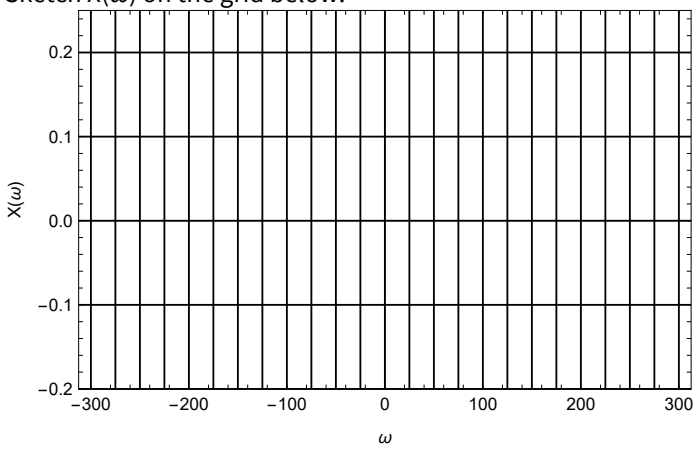
Concept Question #13

1. Given y(t) = rect$\left(\frac{t-0.05}{0.25}\right)$ find the Fourier transform of y(t), Y(ω).

2. Given x(t) = rect$\left(\frac{t}{0.25}\right)$ cos(200t) find the Fourier transform of x(t), X(ω).

Sketch X(ω) on the grid below.



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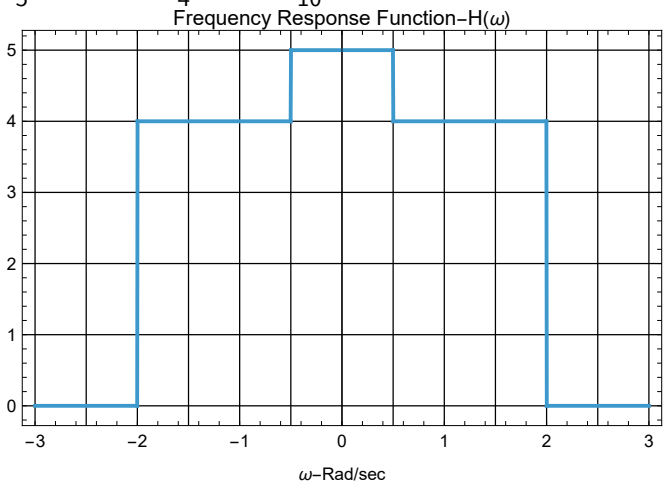
Concept Question #14

1. Given a frequency response, H(ω), shown below; the input to the system is x(t) = $\frac{1}{5}+\frac{1}{5}\cos(0.5t)+\frac{1}{4}\cos(t)+\frac{1}{10}\cos(3t)$ find the output signal y(t).



2. Find the impulse for this system.

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Concept Question #15

1. Given a signal x(t) = $\frac{\text{Sinc}\left[\frac{t}{2}\right]}{2\pi} + \frac{8\,\text{Sinc}[2t]}{\pi}$, find the bandwidth of x(t) in Hz.

2. Find the Nyquist rate (in samples/sec) for sampling x(t).

3. Set sample rate at 1.5 the Nyquist rate and sketch the spectrum of the sampled signal.

4. For a sample rate at 1.5 the Nyquist rate how is x(t) recovered from the sampled signal, $x_s(t)$.

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Concept Question #16

1. Given $y[n] = x[n+2] + 2x[n+1] + 3x[n] + 2x[n-1] + x[n-1]$ Find the impulse response, h[n].

2. Is this system BIBO stable?

3. Is the system causal?

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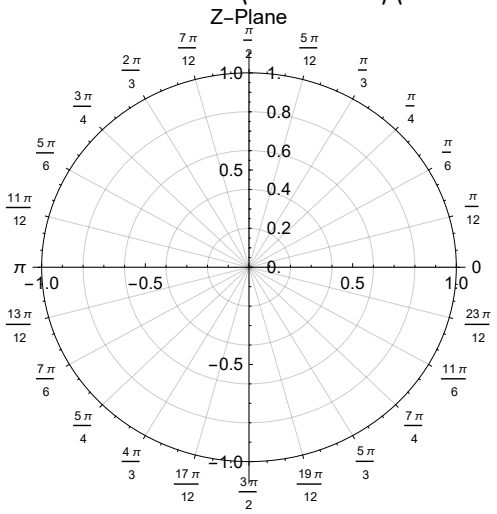
Concept Question #17

1. Given $H(z) = \frac{z^2}{z^2+0.81}$ place the poles and zeros on the z-plane below.

Hint: $z^2 + 0.81 = \left(z - 0.9\, e^{\frac{j\pi}{2}}\right)\left(z - 0.9\, e^{\frac{-j\pi}{2}}\right)$



2. Is this system BIBO stable?

3. Is this system a,

i. LPF ii. BPF iii. BRF iv. HPF Answer: ___

4. What is the corresponding difference equation, i.e., implementation.

5. Draw a system block diagram.

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Concept Question #18

1. Given h[n] = {$\underline{0}$, 1, 1}, find H(z) as a ratio of two polynomials with positive exponents.

2. Given x[n] = {$\underline{1}$, 2, 3}, find the system output y[n] = x[n]$*$h[n]

3. Given H(z) = $\frac{2z}{z-0.5} + \frac{0.9z}{(z-0.9)^2}$ Find h[n]. Hint: Use z-Transform table.

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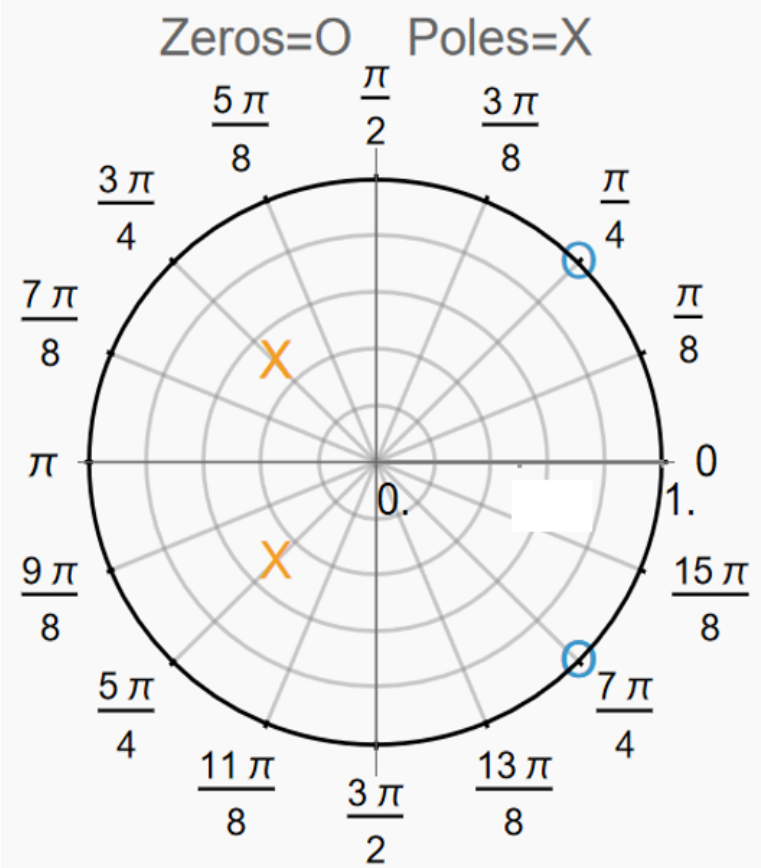
Concept Question #19

1. H(z) has the pole/zero diagram given below.



Is this system a,

i. LPF ii. BPF iii. BRF iv. HPF Answer: ___

2. A signal x(t) = cos(2π1000t) is sampled at a rate of 8000 samples/sec to create x[n]. The discrete time signal x[n] is input to the filter given above. What is the system output.

3. What is the DC gain of this filter.

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Concept Question #20

1. A discrete time system is given by $y[n] = x[n] + 3x[n-1] + x[n-2]$.

a. Find H(z) as a ratio of polynomials in z with positive exponents.

b. An analog signal $x(t) = \cos(2\pi 1000t)$ is sampled at a rate of 2000 samples/sec to create an input signal. What is the system output, y[n]?

c. A DC gain of 1 is required, modify the difference equation accordingly.