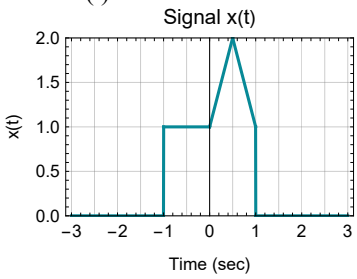
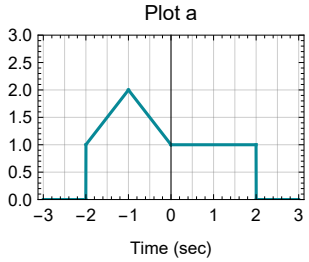
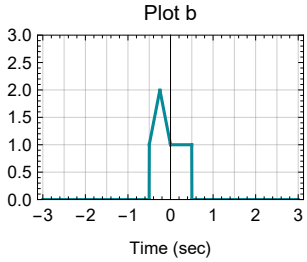
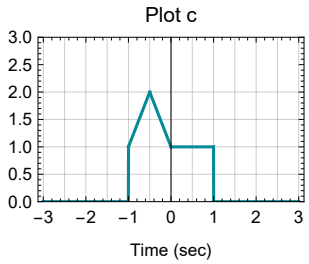
EECS 361
Concept Question #1

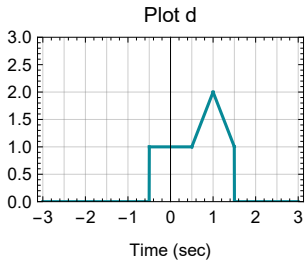
1. Given x(t) shown below. Select the correct plot x(-t).











2. How can you see solutions to homework problems?

a. Ask for a problem to be worked in class
b. Come to office hours and ask to see a problem worked.
c. Schedule a time to come to my office and ask to see a problem worked.
d. All the above

3. How are late homework submissions managed?

a. A 0 is assigned to all late submission.
b. If you contact me (and cc the grader) via email before due date/time as soon as possible to arrange an suitable due date the assignment will be graded.
c. If you contact me (and cc the grader) via email after due date/time to arrange an alternative due date the assignment will be graded.

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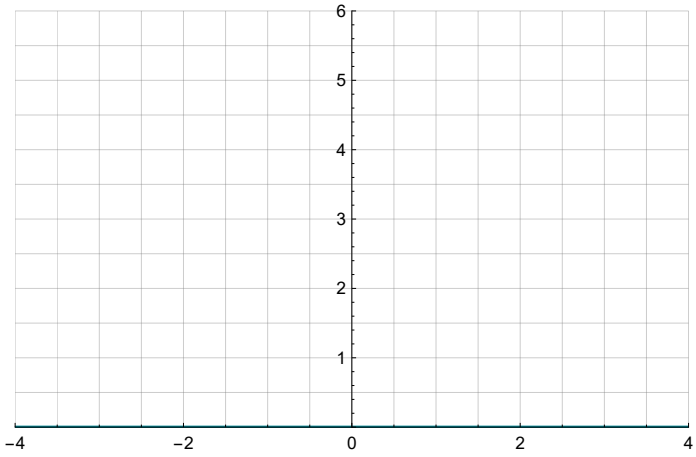
Concept Question #2

1. Let x(t) = 5tri(t). What is $\int_{-\infty}^{\infty} \delta(\tau)\, x(\tau)\, d\tau$?

2. What is $\int_{-\infty}^{\infty} \delta(\tau - 3)\, x(\tau)\, d\tau$?

3. What is $\int_{-\infty}^{\infty} \delta(\tau - 0.5)\, x(\tau)\, d\tau$?

Hint: sketch x(t) on



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Concept Question #3

1. Let x(t) = $\sqrt{2}\cos(\omega_1 t) + 2\cos(\omega_2 t)$ where $\omega_1 \neq \omega_2$. What is the average power in x(t)?

2. Let y(t) = $\sqrt{2}\cos(\omega_1 t + 0.7)$. What is the average power in y(t)?

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Concept Question #4

1. Let the system input be x(t) = 5δ(t-4) and the system impulse response of an LTI system be h(t) = 4tri($\frac{t}{2}$). Find the system output y(t) = x(t)$*$h(t).

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Concept Question #5

1. Let the system input be x(t) = rect(t-1) and the system impulse response of an LTI system be h(t) = t^2 rect(t – 0.5). Find the system output y(t) = x(t)∗h(t).

a. y(0)

b. set up equation to find y(1.5)

c. Find y(1.5)

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Concept Question #6

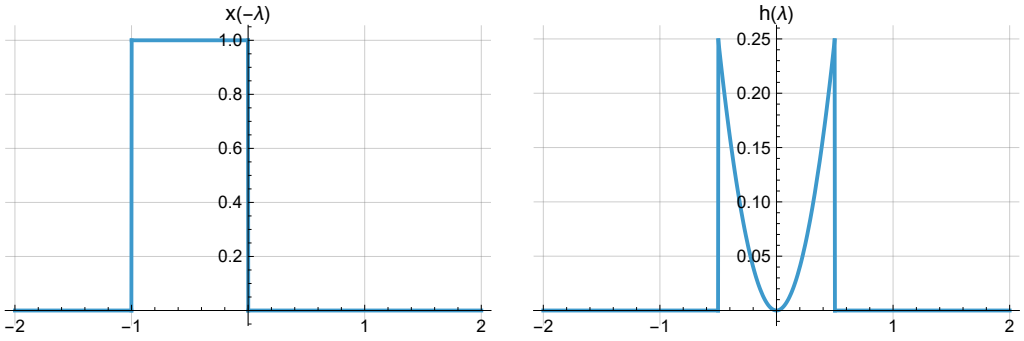
1. Let the system impulse response of an LTI system be h(t) = t^2 rect(t).

a. Is the system causal?

b. Is the system stable?

c. The system input be x(t) = rect(t-$\frac{1}{2}$) and find the system output y(t) = x(t)$*$h(t).

Hint:



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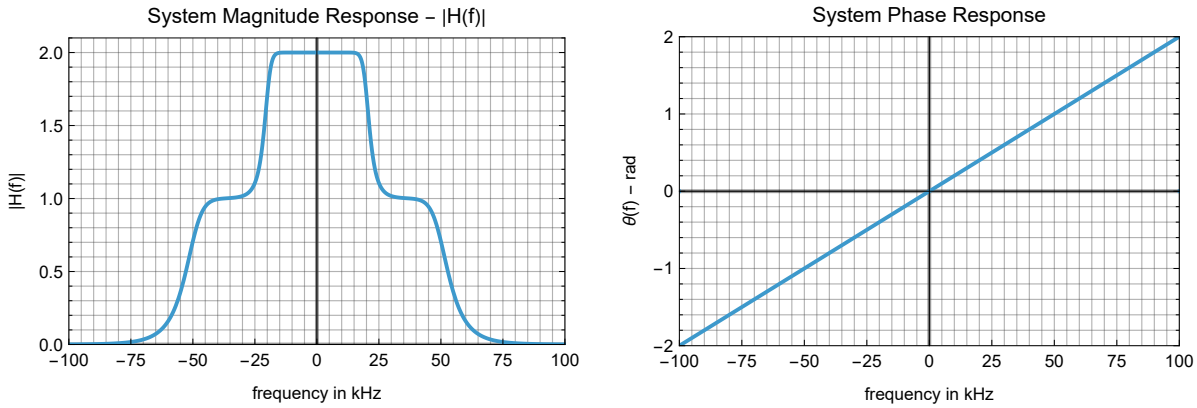
Concept Question #7

1. An LTI system has the magnitude and phase response shown below.



a For an input signal x(t) = cos(2π15000t) find the output signal.

b. For an input signal x(t) = cos(2π15000t) +cos(2π30000t) find the output signal.

c. For an input signal x(t) = cos(2π15000t) +cos(2π30000t) +cos(2π100000t) find the output signal.

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Concept Question #8

1. A system is defined by $\frac{dy(t)}{dt} + y(t) = x(t)$.

a For an input signal x(t) = 1 find the output signal.

b. For an input signal x(t) = cos(t) find the output signal.

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Concept Question #9

1. A system has an input of x(t)=cos(2π100t); for this system the output is y(t)=0.5cos(2π100t)+0.2cos(2π200t). The system is LTI. **Circle TRUE or FALSE.**

2. For $x_p(t) = \sum_{k=-\infty}^{\infty} \text{rect}\left(\frac{t-kT_o}{\tau}\right)$ as T_o increases the spacing between the spectral lines in the magnitude spectrum of $x_p(t)$ will

i. Increase

ii. Decrease

iii Stay the same

Answer: ___

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Concept Question #10

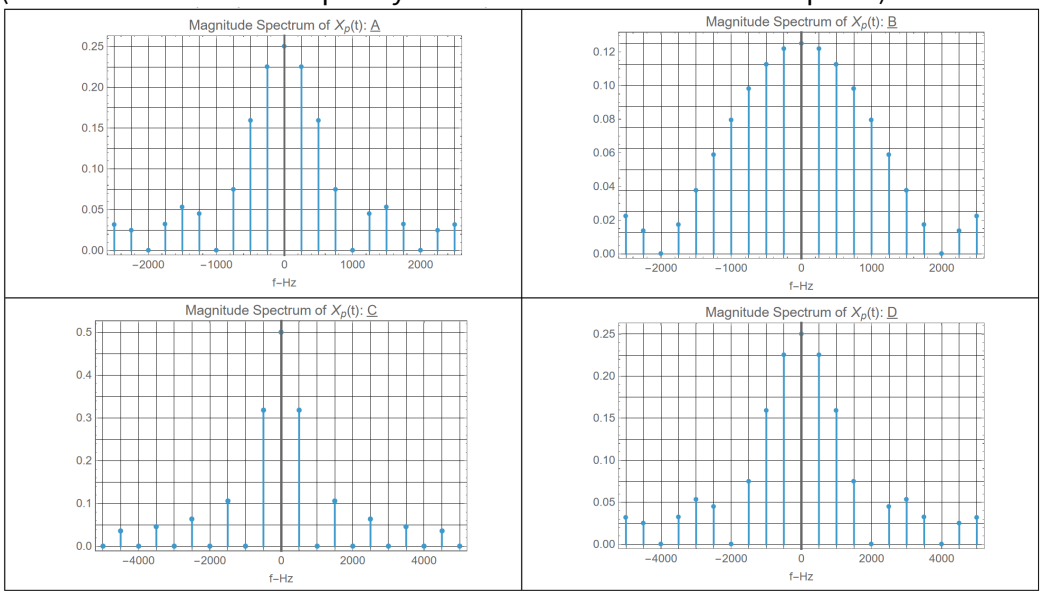
1. Given a periodic signal $x_p(t)$.

$$x_p(t) = \sum_{k=-\infty}^{\infty} rect\left(\frac{t - kT_0}{\tau}\right)$$

The plot of the Magnitude Spectrum of $x_p(t)$ is shown below for different combinations of the pulse width = τ, and period = T_0.

Fill in the table below, that is, match the sets of signal parameters (1, 2, 3, 4)) to a Magnitude Spectrum plot (A, B, C, D).

(Note the scale of the frequency axis is not the same for all four plots.)



Signal Paramters (units seconds)	Magnitude Spectrum of $X_p(t)$
1 : $\tau = 0.5 * 10^{-3}$ $T_0 = 4 * 10^{-3}$	□
2 : $\tau = 1.0 * 10^{-3}$ $T_0 = 2 * 10^{-3}$	□
3 : $\tau = 0.5 * 10^{-3}$ $T_0 = 2 * 10^{-3}$	□
4 : $\tau = 1.0 * 10^{-3}$ $T_0 = 4 * 10^{-3}$	□