

Name _____ CM _____

ECE-300, Quiz #5

1) Are the functions $v_1(t) = 1$ and $v_2(t) = t$ orthogonal over the interval $[0, 1]$?

a) Yes b) No

2) Are the functions $v_1(t) = 1$ and $v_2(t) = t$ orthogonal over the interval $[-1, 1]$?

a) Yes b) No

3) Are the functions $v_1(t) = e^{jk\omega_o t}$ and $v_2(t) = e^{jm\omega_o t}$ where $k \neq m$, k and m are integers, and $\omega_o T_o = 2\pi$, orthogonal over the interval $[0, T_o]$?

a) Yes b) No

Problems 4 and 5 refer to the following Fourier series representation of a periodic signal

$$x(t) = 2 + \sum_{k=-\infty}^{k=\infty} \frac{2}{2 + jk} e^{\frac{jk t}{2}}$$

4) The average value of $x(t)$ is

a) 0 b) 1 c) 2 d) 3

5) The fundamental frequency (in Hz) is

a) $\frac{1}{2\pi}$ b) 0.5 c) $\frac{1}{4\pi}$ d) 2

6) Assume $x(t) = 2 \cos(3t)$ is the input to system with transfer function $H(j\omega) = 2e^{-j\omega}$. In steady state the output of the system will be

a) $y(t) = 4 \cos(3t)e^{-j\omega}$ b) $y(t) = 4 \cos(3t)e^{-j3}$ c) $y(t) = 4 \cos(3t - 3)$
d) $y(t) = 4 \cos(3t + 3)$ e) none of these

7) Assume $x(t) = 2\cos(t) + 5\sin(2t) + 6\sin(3t)$ is the input to a system with transfer function $H(j\omega) = 3\text{rect}\left(\frac{\omega}{5}\right)$. In steady state the output of the system will be

- a) $y(t) = [2\cos(t) + 5\sin(2t) + 6\sin(3t)] \left[3\text{rect}\left(\frac{\omega}{5}\right) \right]$
- b) $y(t) = 6\cos(t) + 15\sin(2t) + 18\sin(3t)$
- c) $y(t) = 6\cos(t) + 15\sin(2t)$
- d) none of these

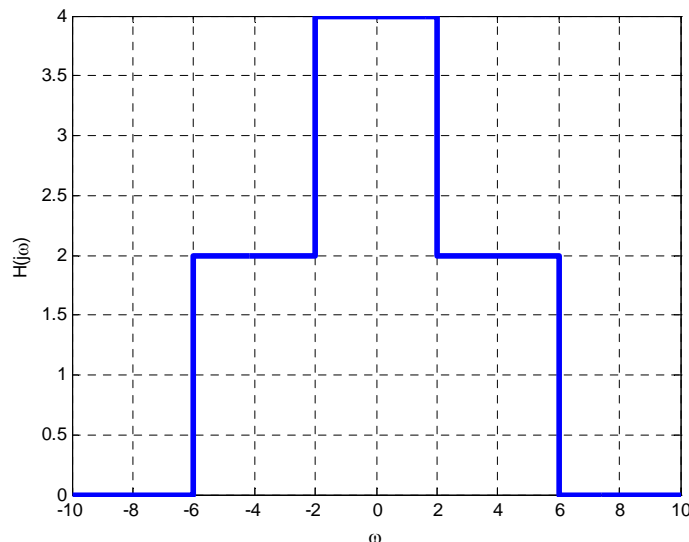
8) Assume $x(t) = 2\cos(3t) + 4\cos(5t)$ is the input to a system with transfer function given by

$$H(j\omega) = \begin{cases} 2 & 4 < |\omega| < 6 \\ 0 & \text{else} \end{cases}$$

The output of the system in steady state will be

- a) $y(t) = 4\cos(3t) + 8\cos(5t)$
- b) $y(t) = 8\cos(5t)$
- c) $y(t) = 4\cos(3t)$
- d) none of these

9) Assume $x(t) = \cos(t) + \cos(5t) + \cos(9t)$ is the input to a system with transfer function given below:



The output of this system in steady state will be

- a) $y(t) = 4\cos(t) + 4\cos(5t)$ b) $y(t) = 4\cos(t) + 2\cos(5t) + \cos(9t)$
- c) $y(t) = 4\cos(t) + 2\cos(5t)$ d) none of these