Name______________________________ CM____________

Quiz 5
(no calculators)

1) Are the functions $v_1(t) = t$ and $v_2(t) = t - \frac{2}{3}$ **orthogonal** over the interval [0,1]?

a) yes b) no

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

a) yes b) no

3) Assume $x(t) = 3 + 2\cos(2t - 3)$ is the input to an LTI system with transfer function

$$H(j\omega) = \begin{cases} 2e^{-j\omega} & |\omega| < 3 \\ 3e^{-j2\omega} & |\omega| \geq 3 \end{cases}$$

The **steady state output** will be

a) $y(t) = 6 + 4\cos(2t - 5)$ b) $y(t) = 4\cos(2t - 5)$ c) $y(t) = [3 + 2\cos(2t - 3)][2e^{-j\omega}]$
d) $y(t) = 6 + 4\cos(2t - 3)e^{-j2}$ e) $y(t) = 3 + 4\cos(2t - 5)$ f) none of these

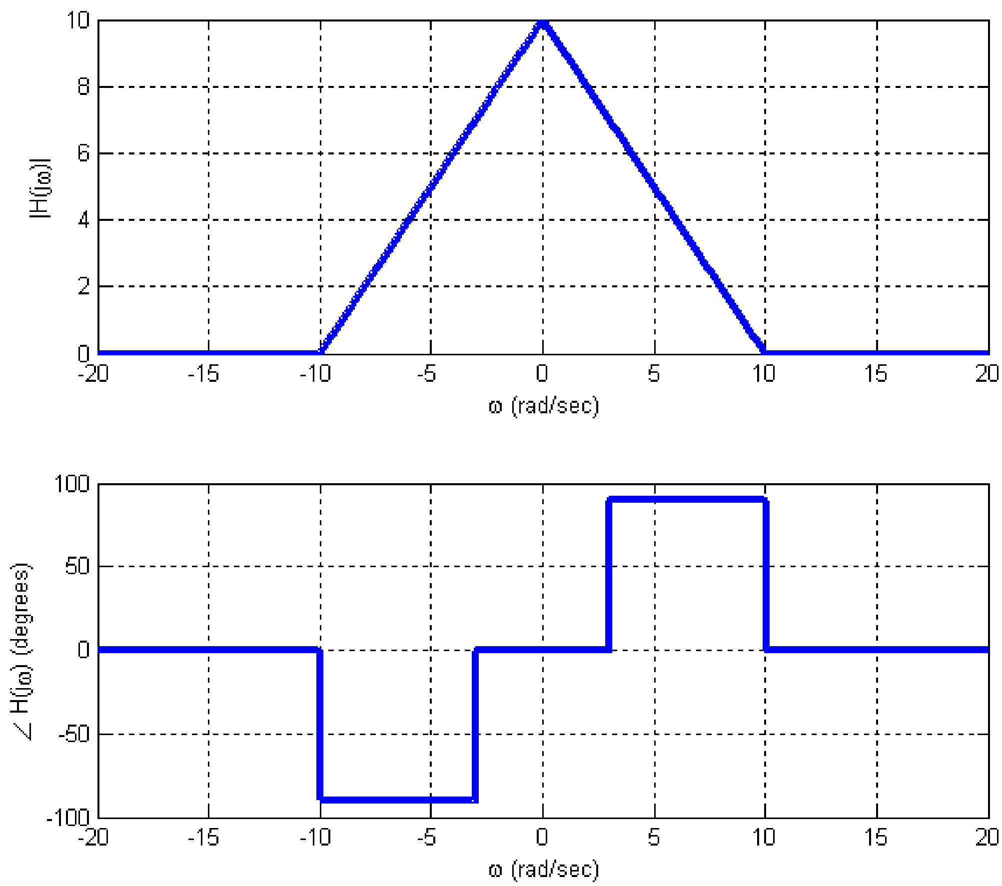
4) Assume $x(t) = 2 + \cos(t)$ is the input to an LTI system with transfer function $H(s) = \frac{2}{s+1}$. The **steady state output** will be

a) $y(t) = 2\cos(2t)\frac{2}{1+j}$ b) $y(t) = 4 + \frac{4}{\sqrt{2}}\cos(2t)$ c) $y(t) = 4 + 4\cos(2t)$
d) $y(t) = 4 + 4\cos(2t - 45^o)$ e) $y(t) = \frac{4}{\sqrt{2}}\cos(2t - 45^o)$ f) none of these

5) The **bandwidth** of the LTI system with transfer function $H(s) = \frac{10}{2s+3}$ is

a) 3 rad/sec b) 3 Hz c) 2 rad/sec d) 0.5 Hz e) 1.5 rad/sec f) 1.5 Hz

6) Assume $x(t) = 2 + \sin(5t) + 3\cos(8t + 30^o)$ is the input to an LTI system with transfer function shown below



The **steady state output** of this system will be

a) $y(t) = 20 + 5\sin(5t + 90^o) + 6\cos(8t + 90^o)$

b) $y(t) = 2 + 5\sin(5t + 90^o) + 6\cos(8t + 90^o)$

c) $y(t) = 20 + 5\sin(5t + 90^o) + 6\cos(8t + 120^o)$

d) $y(t) = 10 + 5\sin(5t + 90^o) + 6\cos(8t + 120^o)$

e) none of these

7) The **magnitude** of the transfer function $H(j\omega)=\dfrac{2e^{-j\omega}}{\dfrac{j\omega}{\omega_0}+\alpha}$ evaluated at $\omega=\omega_0$ is

a) $\dfrac{2}{\sqrt{\alpha^2-1}}$ b) $\dfrac{2}{\sqrt{\alpha^2+1}}$ c) neither of these

8) Using Euler's identity, we can write $\cos(\omega t)$ as

a) $\dfrac{e^{j\omega t}+e^{-j\omega t}}{2j}$ b) $\dfrac{e^{j\omega t}-e^{-j\omega t}}{2}$ c) $\dfrac{e^{j\omega t}+e^{-j\omega t}}{2}$ d) $\dfrac{e^{j\omega t}-e^{-j\omega t}}{2j}$

9) Using Euler's identity, we can write $\sin(\omega t)$ as

a) $\dfrac{e^{j\omega t}-e^{-j\omega t}}{2j}$ b) $\dfrac{e^{j\omega t}-e^{-j\omega t}}{2}$ c) $\dfrac{e^{j\omega t}+e^{-j\omega t}}{2j}$ d) $\dfrac{e^{j\omega t}+e^{-j\omega t}}{2}$

10) Assume $x(t)=1+\cos(3t+45^o)$ is the input to an LTI system with transfer function $H(s)=\dfrac{2s}{s+3}$. The **steady state output** will be

a) $y(t)=1+\dfrac{6}{\sqrt{18}}\cos(3t+90^o)$ b) $y(t)=\dfrac{6}{\sqrt{18}}\cos(3t+45^o)$

c) $y(t)=1+\dfrac{6}{\sqrt{18}}\cos(3t+45^o)$ d) $y(t)=\dfrac{6}{\sqrt{18}}\cos(3t+90^o)$

e) none of these