

Name \_\_\_\_\_ CM \_\_\_\_\_

**Quiz 5**  
**(no calculators)**

1) 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

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

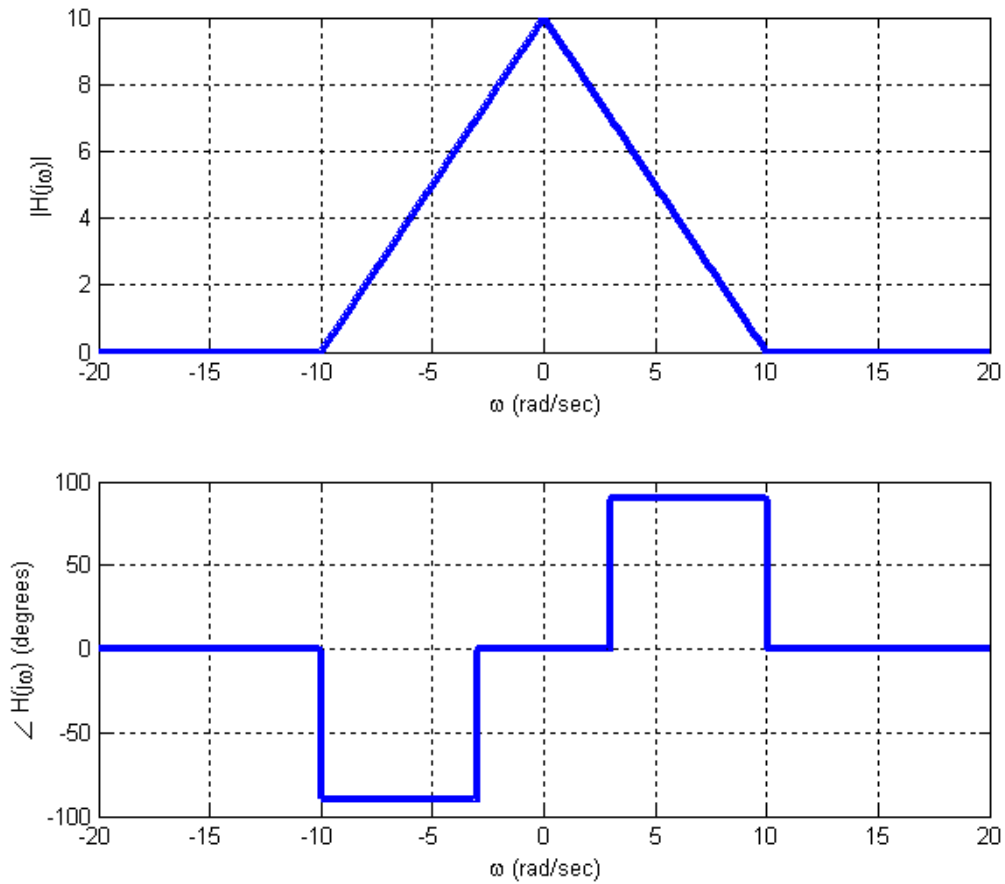
$H(s) = \frac{2}{s+1}$ . The **steady state output** will be

- 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)  $y(t) = 4 + 4\cos(2t - 45^\circ)$     e)  $y(t) = \frac{4}{\sqrt{2}}\cos(2t - 45^\circ)$     f) none of these

3) 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

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



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

- a)  $y(t) = 20 + 5\sin(5t + 90^\circ) + 6\cos(8t + 90^\circ)$
- b)  $y(t) = 2 + 5\sin(5t + 90^\circ) + 6\cos(8t + 90^\circ)$
- c)  $y(t) = 20 + 5\sin(5t + 90^\circ) + 6\cos(8t + 120^\circ)$
- d)  $y(t) = 10 + 5\sin(5t + 90^\circ) + 6\cos(8t + 120^\circ)$
- e) none of these

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

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

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

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

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

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

8) Assume  $x(t) = 1 + \cos(3t + 45^\circ)$  is the input to an LTI system with transfer function

$H(s) = \frac{2s}{s+3}$ . The **steady state output** will be

- a)  $y(t) = 1 + \frac{6}{\sqrt{18}} \cos(3t + 90^\circ)$    b)  $y(t) = \frac{6}{\sqrt{18}} \cos(3t + 45^\circ)$   
c)  $y(t) = 1 + \frac{6}{\sqrt{18}} \cos(3t + 45^\circ)$    d)  $y(t) = \frac{6}{\sqrt{18}} \cos(3t + 90^\circ)$   
e) none of these