

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

**Quiz 6**  
**(no calculators)**

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

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

2) 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)  $\frac{e^{j\omega t} - e^{-j\omega t}}{2j}$

3) Assume we are going to synthesize a periodic signal  $x(t)$  using  $x(t) = \sum c_k e^{jk\omega_0 t}$  where

$c_k = \frac{jk}{1+jk}$ . Will  $x(t)$  be a **real valued function**?

a) Yes   b) No

Problems 4 -6 refer to the following Fourier series representation

$$x(t) = 2 + \sum_{k=-\infty}^{k=\infty} \frac{1}{1+jk} e^{jk\pi t}$$

4) The **average value** of  $x(t)$  is   a) 0   b) 1   c) 2   d) 3

5) The **fundamental frequency** (in Hz) is   a)  $\frac{1}{4\pi}$    b) 2   c)  $\frac{1}{2\pi}$    d) 0.5

6) The **average power** in the first (fundamental) harmonic is

a) 1   b) 2   c) 0   d) 0.5   e) none of these

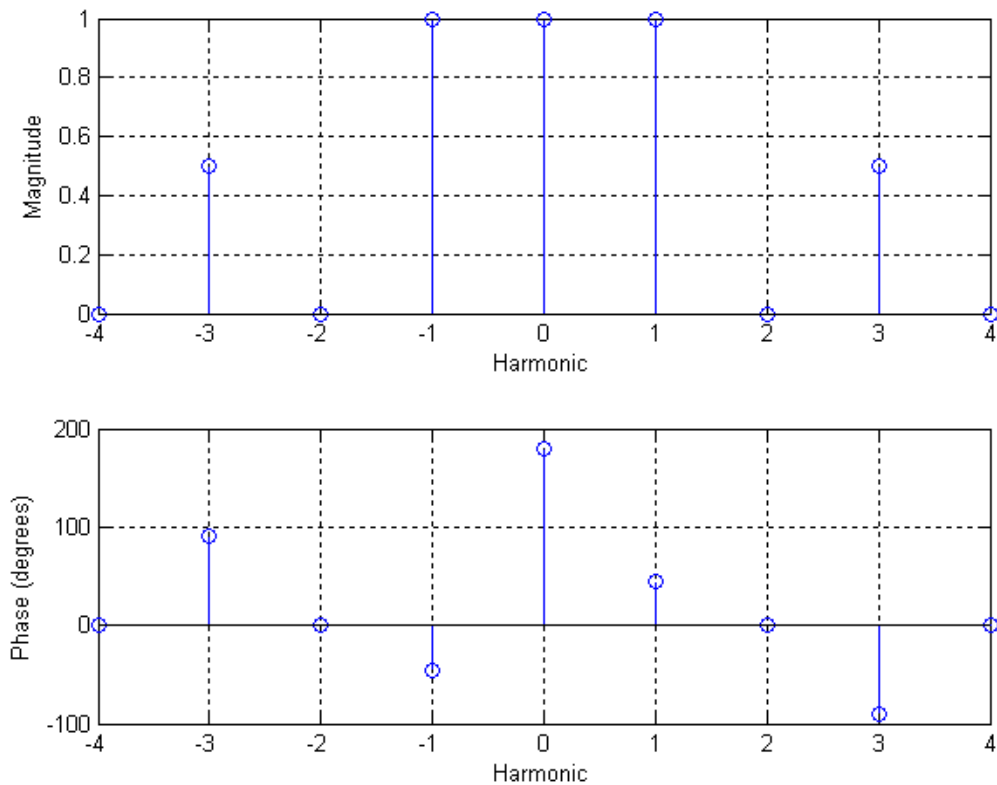
7) Assume  $x(t)$  is a periodic function with period  $T = 2$  seconds.  $x(t)$  is defined over one period as

$$x(t) = \begin{cases} -1 & 0 \leq t \leq 1 \\ 1 & 1 < t < 2 \end{cases}$$

The **average power** in  $x(t)$  (the power averaged over one period) is

a) 0   b) 1   c) 2.5   d) 1.5   e) none of these

Problems 8-10 refer to the following spectrum plot for a signal  $x(t)$  with fundamental frequency  $\omega_o = 2.5$ . All angles are multiples of 45 degrees.



8) What is the **average value** of  $x(t)$ ? a) 4 b) 2 c) -1 d) 1

9) What is the **average power** in  $x(t)$ ? a) 4 b) 3.5 c) 2.25 d) 1.5

10) We can write  $x(t)$  as

- a)  $x(t) = 1 + 1\cos(2.5t + 45^\circ) + 0.5\cos(7.5t - 90^\circ)$
- b)  $x(t) = -1 + 1\cos(2.5t + 45^\circ) + 0.5\cos(7.5t - 90^\circ)$
- c)  $x(t) = 1 + 2\cos(2.5t + 45^\circ) + 1\cos(7.5t - 90^\circ)$
- d)  $x(t) = -1 + 2\cos(2.5t + 45^\circ) + 1\cos(7.5t - 90^\circ)$
- e) none of these