Name _____ CM_____

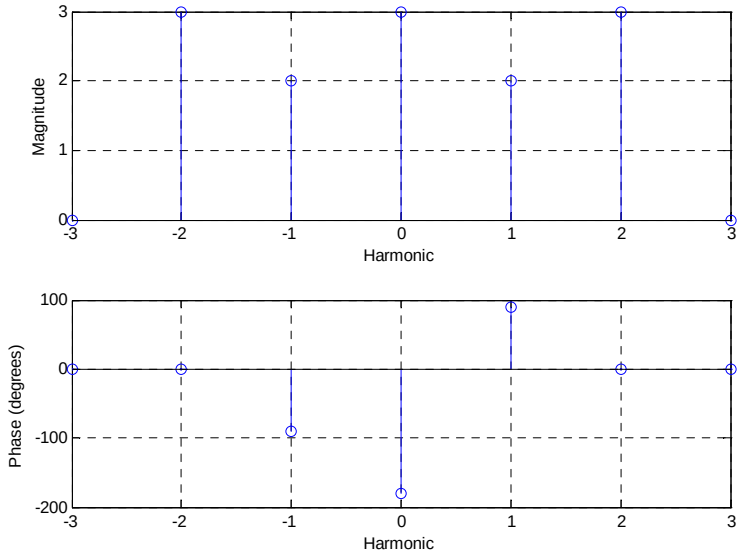
ECE-300, Quiz #5

1) Assume $x(t)$ is a periodic function with Fourier series representation $x(t)=\sum c_k^x e^{jk\omega_o t}$. $x(t)$ is the input to an LTI system with output $y(t)=3\dot{x}(t-2)$. The Fourier series coefficients c_k^y are related to the c_k^x in which of the following ways

a) $c_k^y = 3jk\omega_0 e^{+jk\omega_o 2} c_k^x$ b) $c_k^y = -3jk\omega_0 e^{-jk\omega_o 2} c_k^x$

c) $c_k^y = 3jk\omega_0 e^{-jk\omega_o 2} c_k^x$ d) $c_k^y = -3jk\omega_0 e^{+jk\omega_o 2} c_k^x$

Problems 2-4 refer to the following spectrum plot for a signal $x(t)$ with fundamental frequency $\omega_o = 2$. All angles are multiples of 90 degrees.



2) What is the average value of $x(t)$? a) 13 b) $\frac{13}{7}$ c) $\frac{13}{5}$ d) 3 e) -3

3) What is the average power in $x(t)$? a) 13 b) $\frac{13}{7}$ c) 35 d) 3

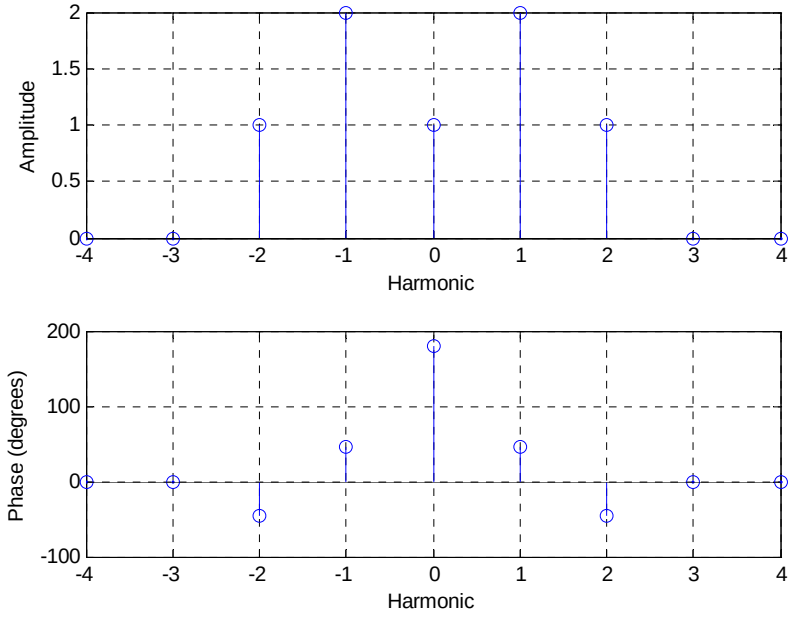
4) If $x(t)$ is the input to a system with transfer function

$$H(\omega)=\begin{cases}2 & 1<|\omega|<3\\ 0 & else\end{cases}$$

the output $y(t)$ in steady state will be

a) $12\cos(2t)$ b) $4\cos(2t+90^o)$ c) $8\cos(t+90^o)$ d) $8\cos(2t+90^o)$ e) $6\cos(2t)$

Problems 5-7 refer to the following plot (all angles are multiples of 45 degrees)



5) Is this a valid spectrum plot for a real valued function $x(t)$? a) Yes b) No

6) Assuming the magnitude portion of the spectrum is correct, what is the average power in $x(t)$?

a) 4 b) 7 c) 11 d) 12

7) Assuming the plot is a valid spectrum plot for a real valued function $x(t)$, the average value of $x(t)$ is

a) 1 b) 2 c) $\frac{7}{4}$ d) -1

Problems 8-10 refer to the following Fourier series representation of a periodic signal

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

8) If $x(t)$ is the input to a system with transfer function

$$H(\omega) = \begin{cases} 2 & |\omega| < 0.4 \\ 0 & else \end{cases}$$

the output $y(t)$ in steady state will be

a) 0 b) 3 c) 6 d) $1.79\cos(\pi t - 26.6^o)$ e) $6 + 3.58\cos(\pi t - 26.6^o)$

9) If $x(t)$ is the input to a system with transfer function

$$H(\omega) = \begin{cases} 2 & |\omega| > 0.4 \\ 0 & else \end{cases}$$

the output $y(t)$ in steady state will be

a) $2x(t)$ b) $2x(t) - 3$ c) $2x(t) - 6$ d) none of these

10) If $x(t)$ is the input to a system with transfer function

$$H(\omega) = \begin{cases} 0 & 0.4 < |\omega| < 0.6 \\ 2 & else \end{cases}$$

the output $y(t)$ in steady state will be

a) $1.79\cos(0.5t - 26.6^o)$ b) $3.58\cos(0.5t - 26.6^o)$

c) $2x(t) - 1.79\cos(0.5t - 26.6^o)$ d) $2x(t) - 3.58\cos(0.5t - 26.6^o)$