Name_____ CM_____

Quiz 8

(no calculators allowed)

In the following problems you should used the Fourier transform and inverse transform integrals:

$$X(\omega) = \int_{-\infty}^{\infty} x(t) e^{-j\omega t} dt$$

$$x(t) = \frac{1}{2\pi} \int_{-\infty}^{\infty} X(\omega) e^{j\omega t} d\omega$$

Don't guess, manipulate the integrals!

1) If $x(t) \leftrightarrow X(\omega)$, then $\alpha x(t+\beta)$ will have Fourier transform

a) $\alpha X(\omega)$ b) $\alpha X(\omega) e^{j\beta\omega}$ c) $\alpha X(\omega) e^{-j\beta\omega}$ d) none of these

2) If $x(t) \leftrightarrow X(\omega)$, then $\frac{d}{dt} x(t)$ will have Fourier transform

a) $\frac{d}{d\omega} X(\omega)$ b) $-j\omega X(\omega)$ c) $j\omega X(\omega)$ d) none of these

3) If $x(t) \leftrightarrow X(\omega)$, then $tx(t)$ will have Fourier transform

a) $j\frac{d}{d\omega} X(\omega)$ b) $-j\frac{d}{d\omega} X(\omega)$ c) $\frac{d}{d\omega} X(\omega)$ d) none of these

4) If $x(t) \leftrightarrow X(\omega)$, then $x\left(\frac{t}{\alpha}\right)$ for $\alpha > 0$ will have Fourier transform

a) $X\left(\frac{\omega}{\alpha}\right)$ b) $X(\alpha\omega)$ c) $\frac{1}{\alpha} X\left(\frac{\omega}{\alpha}\right)$ d) $\alpha X(\alpha\omega)$ e) none of these

5) If $x(t) \leftrightarrow X(\omega)$, then $x(t)e^{j\beta t}$ will have Fourier transform

a) $X(\omega) e^{-j\beta t}$ b) $X(\omega+\beta)$ c) $X(\omega-\beta)$ d) none of these

6) If $x(t) = 2\delta(t-3)$, then $X(\omega)$ is

a) $2e^{j3\omega}$ b) $2e^{j3\omega}u(t)$ c) $2e^{j3\omega}u(\omega)$ d) $2e^{-j3\omega}$ e) none of these

7) If $X(\omega) = 3\delta(\omega-2)$, then $x(t)$ is

a) $3e^{j2t}$ b) $\frac{3}{2\pi}e^{j2t}$ c) $\frac{3}{2\pi}e^{j2t}u(t)$ d) $\frac{3}{2\pi}e^{-j2t}$ e) none of these

8) If $X(\omega) = \text{sinc}\left(\frac{\omega T}{2\pi}\right)$, the first nulls (zero points) are at

a) $\omega = \pm 1$ b) $\omega = \pm\frac{\pi}{T}$ c) $\omega = 0$ d) $\omega = \pm\frac{T}{\pi}$ e) none of these

9) If $x(t) = A\sin(2t)$, $X(\omega)$ will be nonzero

a) for all ω b) for all $\omega = 2k$, k an integer c) for $\omega = 2$ only d) for $\omega = \pm 2$

10) If we have the transfer function

$$H(s) = \frac{1}{(s+2)(s+20)}$$

the bandwidth of the system is

a) 2 rad/sec b) 2 Hz c) 20 rad/sec d) 20 Hz e) none of these