ECE-300, Quiz #1

1) If $z = \dfrac{2-j}{3+2j}$, then the **magnitude** of z , $|z|$, is   a) $\dfrac{\sqrt{5}}{\sqrt{13}}$ b) $\dfrac{\sqrt{3}}{\sqrt{5}}$ c) $\dfrac{\sqrt{1}}{\sqrt{5}}$ d) 1

2) If $z = \dfrac{1}{1+j}$, then the **phase** of z , $\measuredangle z$, is   a) 0° b) 45° c) -45° d) -90°

Problems 3-5 refer to a system with transfer function $H(s) = \dfrac{10}{s+3}$. Assume the input to this

system is $x(t) = 2\cos(3t + 30^o)$

3) In steady state, the **magnitude** of the output will be

a) $\dfrac{20}{3}$ b) $\dfrac{20}{\sqrt{18}}$ c) $\dfrac{20}{\sqrt{8}}$ d) $\dfrac{20}{6}$

4) In steady state, the **phase** of the output will be   a) 30° b) 45° c) -15° d) -45°

5) The **bandwidth** (-3 dB point) of the system is

a) 10 Hz   b) 10 radians/sec   c) 3 radians/sec   d) 3 Hz

6) The integral $\displaystyle\int_{-\infty}^{\infty} u(t+1)u(t-2)e^{-t}dt$ can be simplified as

a) $\displaystyle\int_{-1}^{\infty} e^{-t}dt$ b) $\displaystyle\int_{2}^{\infty} e^{-t}dt$ c) $\displaystyle\int_{-1}^{2} e^{-t}dt$ d) none of these
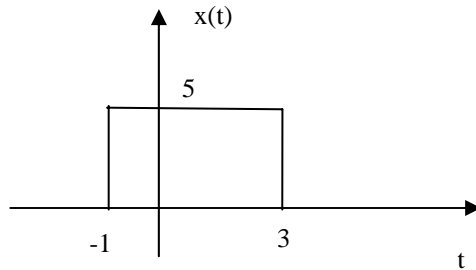
7) The integral $\displaystyle\int_{-\infty}^{\infty} u(-1-\lambda)e^{-|\lambda|}d\lambda$ can be simplified as

a) $\displaystyle\int_{-\infty}^{-1} e^{-|\lambda|}d\lambda$ b) $\displaystyle\int_{-1}^{\infty} e^{-|\lambda|}d\lambda$ c) $\displaystyle\int_{1}^{\infty} e^{-|\lambda|}d\lambda$ d) none of these

8) The function $x(t)$ below can best be represented by the function
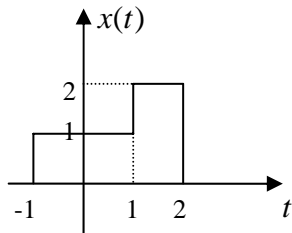
a) $x(t) = 5rect(\dfrac{t}{2})$ b) $x(t) = 5rect(\dfrac{t-1}{2})$

c) $x(t) = 5rect(\dfrac{t}{4})$ d) $x(t) = 5rect(\dfrac{t-1}{4})$

9) The function $x(t)$ below can best be modeled by the function

a) $x(t) = u(t+1) + u(t-1) - u(t-2)$ b) $x(t) = u(t+1) + 2u(t-1) - 2u(t-2)$
c) $x(t) = u(t+1) + u(t-1) - 2u(t-2)$ d) $x(t) = u(t+1) + 2u(t-1) - 3u(t-2)$

10) The function $x(t) = \sin\left(\dfrac{\pi}{2}t\right)\delta(t-1) + t$ can be simplified as

a) $x(t) = 2$ b) $x(t) = 1+t$ c) $x(t) = \delta(t-1) + t$ d) $x(t) = \delta(t-1) + 1$

11) The integral $\displaystyle\int_{0}^{10} \delta(\lambda-1)\delta(\lambda-2)d\lambda$ can be simplified as

a) 0   b) 1   c) none of these

12) The integral $\displaystyle\int_{-1}^{5} t\delta(\lambda-2)d\lambda$ can be simplified as
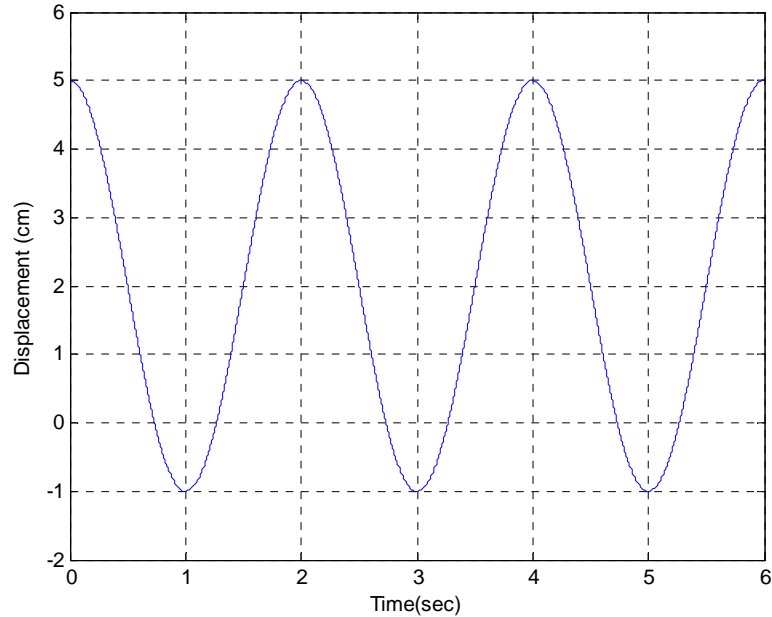
a) 2   b) t c) $2\delta(t-2)$ d) $t\delta(t-2)$

13) The integral $\int_{-1}^{2} \delta(t-3)dt$ can be simplified as

a) 1   b) 0   c) 3   d) $\delta(t-3)$

Problems 14-16 refer to the signal shown below, which we want to model as

$x(t) = A + B\cos(\omega t)$

14) Of the following, which is the best estimate of A ?

a) 0   b) 1   c) 2   d) 3

15) Of the following, which is the best estimate of B ?

a) 0   b) 1   c) 2   d) 3

16) Of the following, which is the best estimate of ω ?

a) 1   b) 2   c) $\dfrac{\pi}{2}$ d) π