Practice Quiz 3

(no calculators allowed)

1) Fill in the following table with a Y (yes) or N (no) for each of the system models given. Assume $-\infty < t < \infty$ for all of the systems.

System	System Model	Linear?	Time-Invariant?	Causal?	Memoryless?
A	$y(t) = 3\sin(t+1)x(t-1)$				
B	$y(t) = x\left(\frac{t}{2} - 1\right)$				
C	$y(t) = x(1-t)$				
D	$\dot{y}(t) + t^2 y(t) = \sin(t)x(t)$				
E	$y(t) = \int_{-\infty}^{t} e^{-(t-\lambda)} x(\lambda+1)\, d\lambda$				

2) The **average power** in the signal $x(t) = ce^{j\omega_0 t}$ is

a) 0 b) $\frac{|c|}{2}$ c) $|c|^2$ d) $\frac{|c|^2}{2}$

3) The **average power** in the signal $x(t) = A\cos(\omega_0 t + \theta)$ is

a) $\frac{|A|}{2}$ b) $|A|$ c) A^2 d) $\frac{A^2}{2}$

4) The **average power** in the signal $x(t) = ce^{j\omega_0 t} + de^{j2\omega_0 t}$ is

a) 0 b) $\frac{|c|}{2} + \frac{|d|}{2}$ c) $|c|^2 + |d|^2$ d) $\frac{|c|^2}{2} + \frac{|d|^2}{2}$

5) The **average power** in the signal $x(t) = A\cos(\omega_0 t + \theta) + B\cos(2\omega_0 t + \phi)$ is

a) $\frac{|A|}{2} + \frac{|B|}{2}$ b) $|A| + |B|$ c) $A^2 + B^2$ d) $\frac{A^2}{2} + \frac{B^2}{2}$

6) The signal $x(t) = e^{-t}\cos(t)u(t)$ is

a) an energy signal b) a power signal c) neither energy or power

7) The signal $x(t) = \cos(t)[u(t) - u(t-10)]$ is

a) an energy signal b) a power signal c) neither energy or power

8) The integral $h(t)=\int_{-\infty}^{t+1} e^{-(t-\lambda)}\delta(\lambda+3)d\lambda$ can be simplified as

a) $e^{-(t+3)}u(t)$ b) $e^{-(t+3)}u(t+1)$ c) $e^{-(t+3)}u(t+3)$ d) $e^{-(t+3)}u(t+4)$

9) The integral $h(t)=\int_{-\infty}^{t-3} e^{-(t-\lambda)}\delta(\lambda-1)d\lambda$ can be simplified as

a) $e^{-(t-1)}u(t)$ b) $e^{-(t-1)}u(t-1)$ c) $e^{-(t-1)}u(t-3)$ d) $e^{-(t-1)}u(t-4)$

10) The integral $h(t)=\int_{-t+2}^{5} e^{-(t-\lambda)}\delta(\lambda-3)d\lambda$ can be simplified as

a) $e^{-(t-3)}u(t)$ b) $e^{-(t-3)}u(t+1)$ c) $e^{-(t-3)}u(t-3)$ d) $e^{-(t-3)}u(2-t)$

11) If $z_1=\frac{1-j}{1+j}$ and $z_2=\frac{1}{1+j}$, then the **magnitude** of $z=z_1z_2$, $|z|$, is equal to

a) $\frac{1}{\sqrt{2}}$ b) $\sqrt{2}$ c) 1 d) none of these

12) If $z_1=\frac{1-j}{1+j}$ and $z_2=\frac{1}{1+j}$, then the **phase** of $z=z_1z_2$, $\angle z$, is equal to

a) 0^o b) 45^o c) -45^o d) 135^o e) -135^o f) none of these

13) If $z_1=\frac{2-j}{1+3j}$ and $z_2=\frac{3+j}{2+j}$, then the **magnitude** of $z=z_1z_2$, $|z|$, is equal to

a) $\sqrt{\frac{4}{5}}$ b) $\sqrt{2}$ c) 1 d) none of these

14) If $z_1=\frac{j}{1+j}$ and $z_2=\frac{1}{1-j}$, then the **phase** of $z=z_1z_2$, $\angle z$, is equal to

a) 0^o b) 45^o c) -45^o d) 135^o e) -135^o f) none of these

Answers: 1) **A**--Y,N,Y,N **B**--Y,N,N,N **C**--Y,N,N,N **D**--Y,N,Y,N **E**--Y,Y,N,N
2) c 3) d 4) c 5) d 6) a 7)a 8) d 9) d 10) b
11) a 12) e 13) c 14) f ($\angle z=90^o$)