ECE-205 Practice Quiz 5

1) The integral $\int_{-t+2}^{\infty} \delta(\lambda+5)d\lambda$ is equal to

a) $u(t)$ b) $u(t+5)$ c) $u(t-7)$ d) $u(-t+2)$ e) none of these

2) The integral $\int_{-\infty}^{t-3} \delta(\lambda-2)d\lambda$ is equal to

a) $u(t)$ b) $u(t-3)$ c) $u(t-2)$ d) $u(t+5)$ e) $u(t-5)$ f) none of these

3) The integral $\int_{-\infty}^{t} e^{-\lambda}\delta(\lambda-2)d\lambda$ is equal to

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

4) The function $x(t)=e^{t-1}\delta(t-2)$ can be simplified as

a) $x(t)=e^{1}$ b) $x(t)=e^{1}\delta(t-2)$ c) $x(t)=e^{1}u(t-2)$ d) none of these

5) The integral $\int_{-\infty}^{t} u(\lambda-1)\delta(\lambda+2)d\lambda$ can be simplified as

a) $u(t+2)$ b) $u(t-1)$ c) $u(t)$ d) none of these

6) The integral $\int_{2}^{t} \delta(\lambda-1)d\lambda$ is equal to

a) 0 b) $u(t)$ c) $-u(1-t)$ d) $u(t-2)$ e) none of these

7) The integral $\int_{-5}^{5} u(1-\lambda)u(\lambda+1)d\lambda$ is equal to a) 0 b) 1 c) 2 d) 10 e) none of these

8) The integral $\int_{-3}^{t} u(\lambda-1)d\lambda$ is equal to a) 0 b) $t+3$ c) $(t+3)u(t+3)$ d) $t-1$ e) $(t-1)u(t-1)$

9) The **impulse response** for the LTI system $y(t)=\frac{1}{2}[x(t)-x(t-1)]$ is

a) $h(t)=\frac{1}{2}[u(t)-u(t-1)]$ b) $h(t)=\frac{1}{2}[\delta(t)-\delta(t-1)]$ c) neither of these

10) The **impulse response** for the LTI system $y(t)=\int_{-\infty}^{t+1} e^{-(t-\lambda)}x(\lambda)d\lambda$ is

a) $h(t)=e^{-t}u(t)$ b) $h(t)=e^{-t}u(t+1)$ c) $h(t)=e^{-t}\delta(t)$ d) none of these

11) The **impulse response** for the LTI system $y(t)=2x(t)+\int_{-\infty}^{t-2} e^{-(t-\lambda)}x(\lambda+3)d\lambda$ is

a) $h(t)=2u(t)+e^{-(t+3)}u(t+1)$ b) $h(t)=2\delta(t)+e^{-(t+3)}u(t+1)$

c) $h(t)=2\delta(t)+e^{-(t+3)}u(t)$ d) $h(t)=2\delta(t)+e^{-(t+3)}u(t-2)$

e) $h(t)=2\delta(t)+e^{-(t+3)}u(t+3)$ f) none of these

12) The **impulse response** for the LTI system $\dot{y}(t)+y(t)=x(t-1)$ is

a) $h(t)=e^{t}u(t)$ b) $h(t)=e^{-t}u(t)$ c) $h(t)=e^{-(t-1)}u(t)$

d) $h(t)=e^{-(t-1)}u(t-1)$ e) $h(t)=e^{(t-1)}u(t-1)$ f) none of these

13) The **impulse response** for the LTI system $\dot{y}(t)-2y(t)=3x(t+1)$ is

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

d) $h(t)=3e^{-2(t+1)}u(t)$ e) $h(t)=3e^{2(t+1)}u(t)$ f) none of these

14) The **unit step response** of a system with impulse response $h(t)=e^{-(t-1)}u(t-1)$ is

a) $y(t)=[1-e^{-(t-1)}]\,u(t-1)$ b) $y(t)=[1-e^{-(t-1)}]\,u(t)$ c) $y(t)=[1-e^{(t-1)}]\,u(t)$

d) $y(t)=[1-e^{(t-1)}]\,u(t-1)$ e) none of these

15) If the unit step response of a system is $y(t)=A(1-e^{-t/\tau})\,u(t)$, the **impulse response** of the system is

a) $h(t)=\frac{A}{\tau}e^{-t/\tau}\delta(t)$ b) $h(t)=\frac{A}{\tau}e^{-t/\tau}u(t)$ c) $h(t)=\frac{A}{\tau}e^{-t/\tau}$ d) $h(t)=A\tau e^{-t/\tau}u(t)$

16) 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) $e^{-(t+3)}u(t+4)$

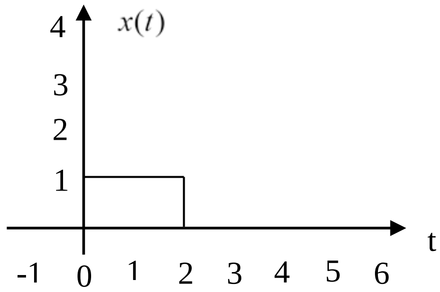
17) The integral $h(t)=\int_{-\infty}^{t-3}e^{-(t-\lambda)}\delta(\lambda-1)d\lambda$ can be simplified as

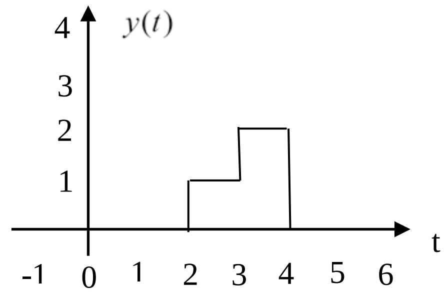
a) $e^{-(t-1)}u(t)$ b) $e^{-(t-1)}u(t-1)$ c) $e^{-(t-1)}u(t-3)$ d) $e^{-(t-1)}u(t-4)$

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

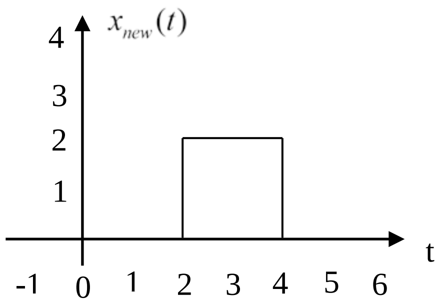
a) $e^{-(t-3)}u(t)$ b) $e^{-(t-3)}u(t+1)$ c) $e^{-(t-3)}u(t-3)$ d) $e^{-(t-3)}u(2-t)$

19) Assume we know a system is a linear time invariant (LTI) system. We also know the following input $x(t)$ – output $y(t)$ pair:



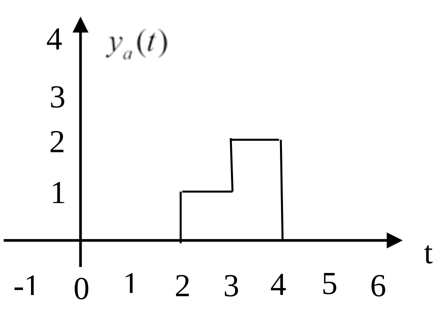


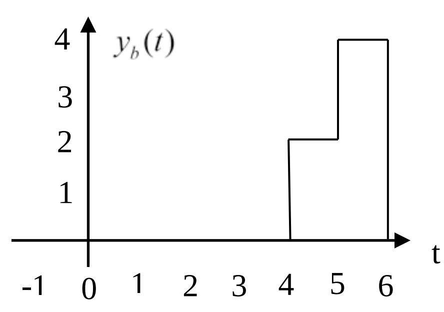
If the input to the system is now $x_{new}(t)$

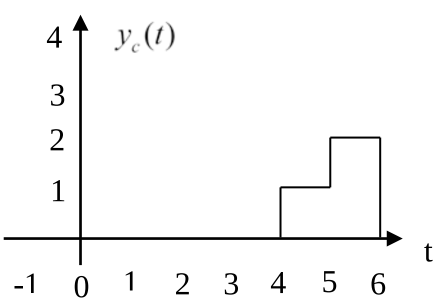


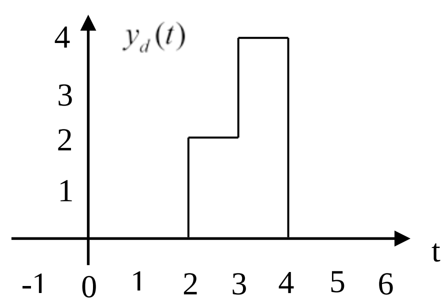
Which of the following best represents the output of the system?

a) $y_a(t)$ b) $y_b(t)$ c) $y_c(t)$ d) $y_d(t)$









20) The integral $y(t)=\int_0^t e^{-a\lambda}d\lambda$ can be simplified to

a) $y(t)=a(1-e^{-at})u(t)$ b) $y(t)=\frac{1}{a}(1-e^{-at})u(t)$ c) $y(t)=a(e^{-at}-1)u(t)$ d) $y(t)=\frac{1}{a}(e^{-at}-1)u(t)$

21) The integral $y(t)=\int_0^t e^{-(t-\lambda)}e^{-\lambda}d\lambda$ can be simplified to

a) $y(t)=e^{t}u(t)$ b) $y(t)=e^{-t}u(t)$ c) $y(t)=te^{-t}u(t)$ d) none of these

Answers: 1-c, 2-e, 3-a, 4-b, 5-d, 6-c, 7-c, 8-e, 9-b, 10-b, 11-b, 12-d, 13-a, 14-a, 15-b, 16-d, 17-d, 18-b , 19-b

20-b, 21-c,