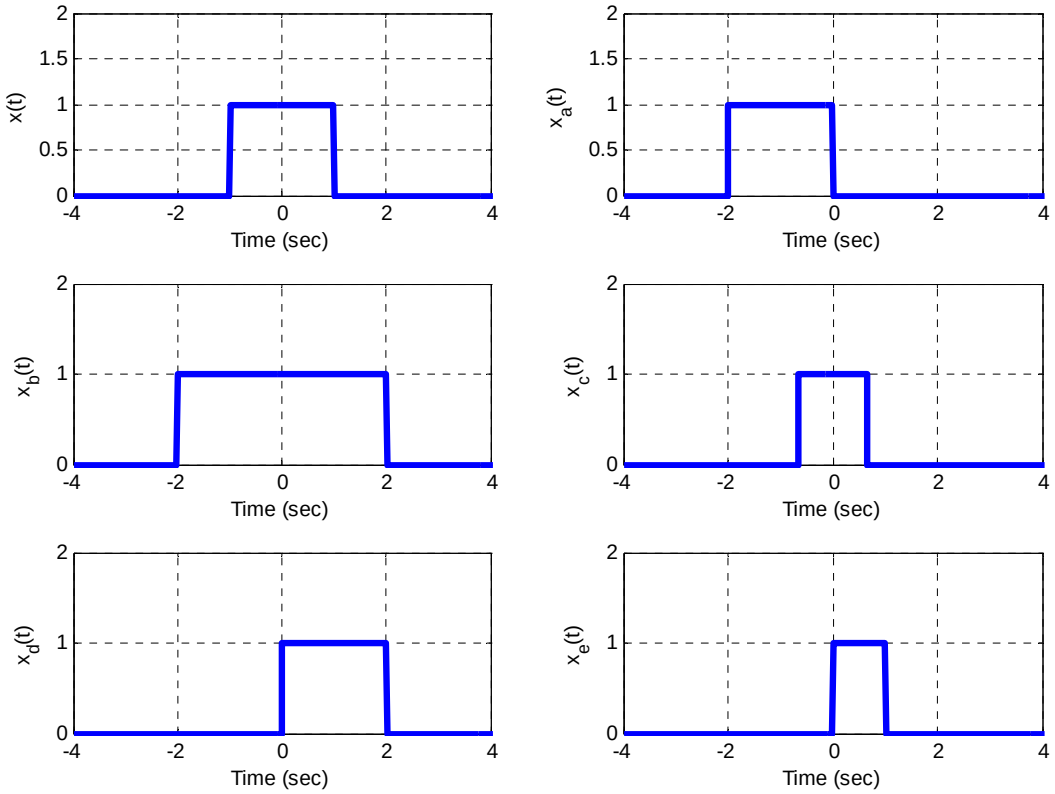
Practice Quiz 2

(no calculators allowed)

In the figure below, $x(t)$ is the original signal (in the upper left corner)



1) Which signal represents $x\left(\frac{t}{2}\right)$? $x_a(t)$ $x_b(t)$ $x_c(t)$ $x_d(t)$ $x_e(t)$

2) Which signal represents $x(2t-1)$? $x_a(t)$ $x_b(t)$ $x_c(t)$ $x_d(t)$ $x_e(t)$

3) Which signal represents $x(t+1)$? $x_a(t)$ $x_b(t)$ $x_c(t)$ $x_d(t)$ $x_e(t)$

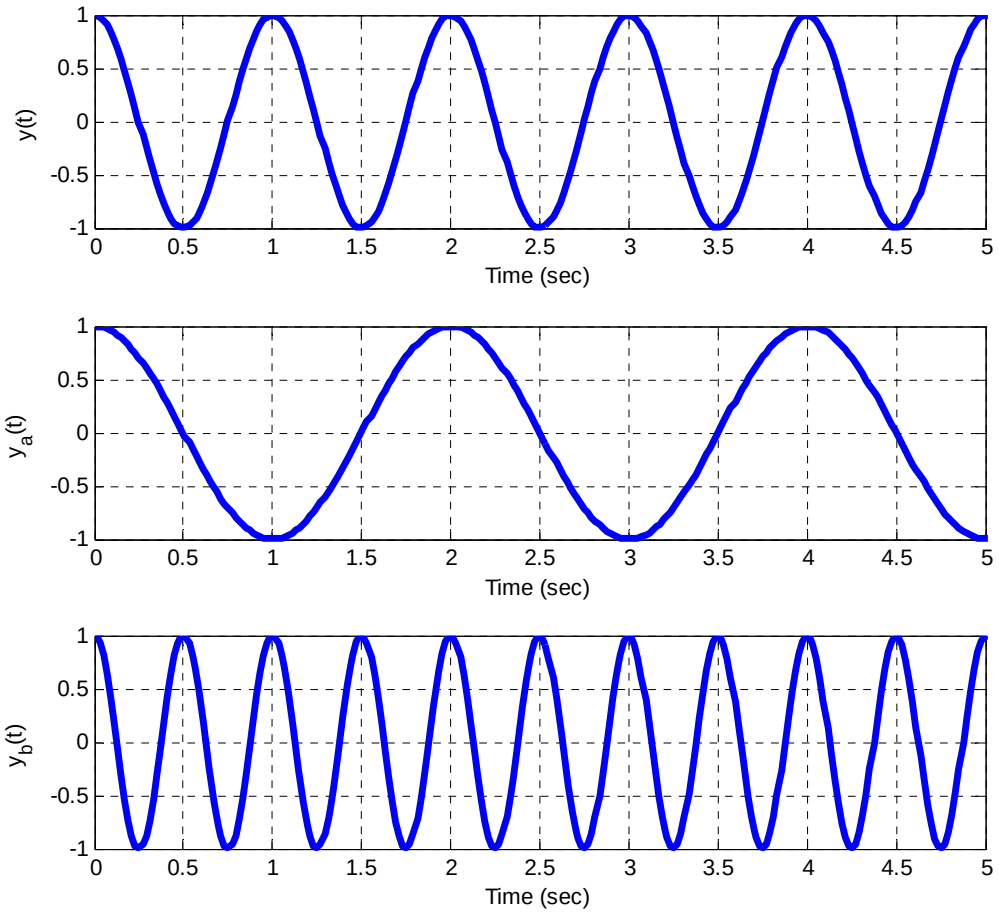
4) Which signal represents $x(1.5t)$? $x_a(t)$ $x_b(t)$ $x_c(t)$ $x_d(t)$ $x_e(t)$

5) Which signal represents $x(t-1)$? $x_a(t)$ $x_b(t)$ $x_c(t)$ $x_d(t)$ $x_e(t)$

6) Which signal represents a **compressed** $x(t)$? $x_a(t)$ $x_b(t)$ $x_c(t)$ $x_d(t)$ $x_e(t)$

7) Which signal represents an **expanded** $x(t)$? $x_a(t)$ $x_b(t)$ $x_c(t)$ $x_d(t)$ $x_e(t)$

In the following figure, the original signal $y(t)$ is in the top panel



8) Which signal has the highest frequency? $y(t)$ $y_a(t)$ $y_b(t)$

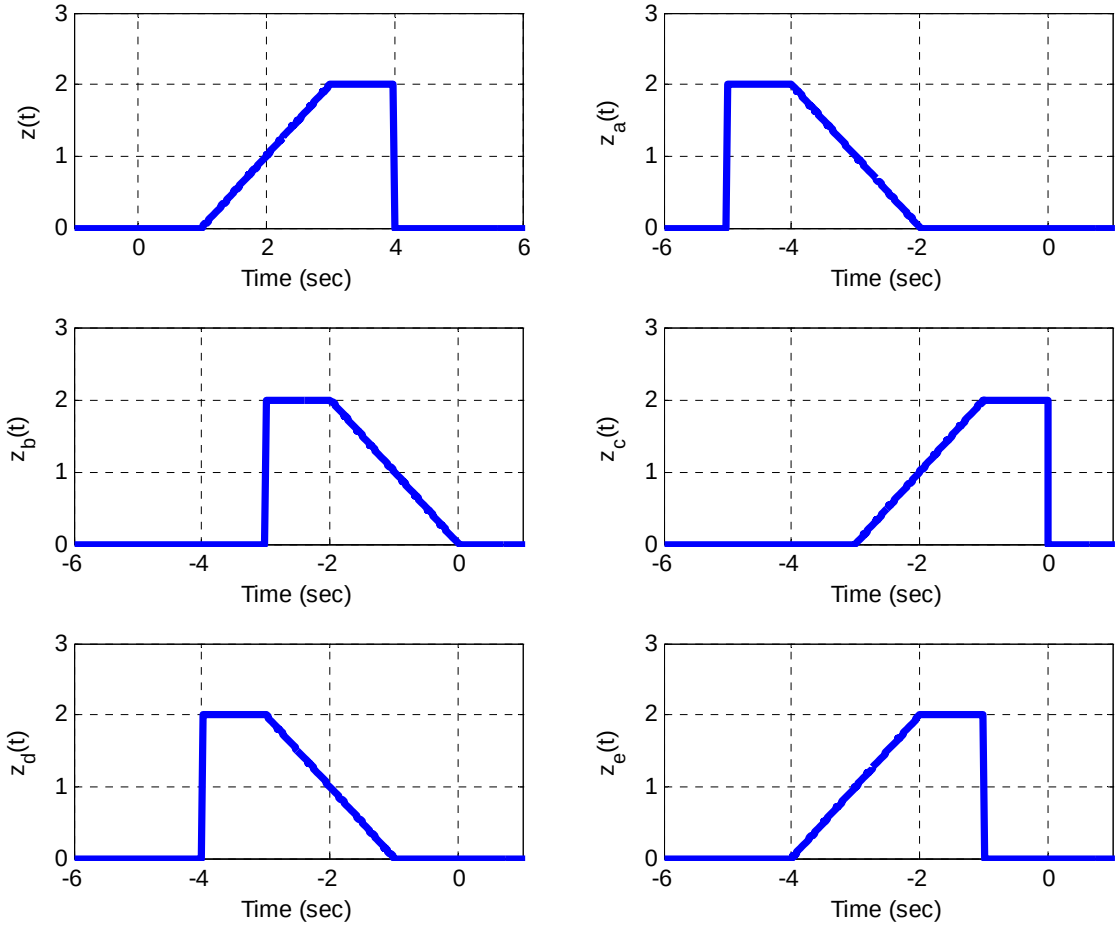
9) Which signal has the lowest frequency? $y(t)$ $y_a(t)$ $y_b(t)$

10) $y(t) = y_a(ct)$ for what value of c ? $c = 0.5$ $c = 1.0$ $c = 1.5$ $c = 2.0$

11) $y(t) = y_b(ct)$ for what value of c ? $c = 0.5$ $c = 1.0$ $c = 1.5$ $c = 2.0$

12) Which signal is a **compressed** version of $y(t)$? $y_a(t)$ $y_b(t)$

The original signal z(t) is in the top left panel.



13) Which of the above signals represents $z(-t)$? $z_a(t)$ $z_b(t)$ $z_c(t)$ $z_d(t)$ $z_e(t)$

14) Which of the above signals represents $z(-t+1)$ $z_a(t)$ $z_b(t)$ $z_c(t)$ $z_d(t)$ $z_e(t)$

15) 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

16) 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

17) 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

18**)** 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

19) 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

20) 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

21) 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

22) 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) $(t-1)u(t-1)$

23) The function $x(t)=e^{j1.5t}+3e^{j3t}$ is

a) not periodic
b) periodic with period 2π
c) periodic with period $\frac{4\pi}{3}$
d) periodic with period 2

24) The function $x(t)=\cos(3t+45^{o})+\sin(\pi t)$ is

a) not periodic
b) periodic with period 2π
c) periodic with period $\frac{\pi}{3}$
d) periodic with period $\frac{3}{\pi}$

25) The function $x(t) = 2\cos(\pi t) + 3j\sin(2\pi t + 30^o)$ is

a) not periodic
b) periodic with period 1
c) periodic with period 2
d) periodic with period 2π

26) If $z = \dfrac{j}{1-j}$, the **magnitude** of z, $|z|$ is

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

27) If, $z = \dfrac{1+j}{1-j}$ the **phase** of z, $\angle z$, is

a) 45^o b) -45^o c) 90^o d) -90^o e) none of these

28) If we made the variable substitution $\sigma = 1 - \dfrac{\lambda}{2}$ in the integral $\int_2^6 e^{\lambda} x\left(1 - \dfrac{\lambda}{2}\right) d\lambda$, the new integral is

a) $2\int_2^6 e^{2-2\sigma} x(\sigma) d\sigma$ b) $\dfrac{1}{2}\int_{-2}^0 e^{2-2\sigma} x(\sigma) d\sigma$ c) $2\int_{-2}^0 e^{2-2\sigma} x(\sigma) d\sigma$ d) none of these

29) Assume $x(t) = 2\cos(3t)$ is the input to an LTI system with transfer function $H(j\omega) = 2e^{-j\omega}$. In steady state the output of this system will be

a) $y(t) = 4\cos(3t)e^{-j3}$ b) $y(t) = 4\cos(3t-3)$ c) $y(t) = 4\cos(3t-1)$ d) none of these

Problems 30-32 refer to a system with transfer function $H(s) = \frac{10}{s+3}$. Assume the input to this system is $x(t) = 2\cos(3t + 30^o)$

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

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

31) In steady state, the **phase** of the output will be

a) 30^o b) 45^o c) -15^o d) -45^o

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

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

Answer Key

1) xb 2) xe 3) xa 4) xc 5) xd 6) xc (xe is compressed and shifted) 7) xb
8) yb 9) ya 10) c=2 11) c=0.5 12)yb
13) zd 14) zb 15) c 16) e
17) a 18) b 19) d 20) c 21) c 22) e 23) c 24) a
25) c 26) c 27) c 28) c
29) b 30) b 31) c 32) c