1. Which of the following is done to convert a continuous time signal into discrete time signal?
a) Modulating
b) Sampling
c) Differentiating
d) Integrating

Answer: b

2. The deflection voltage of an oscilloscope is a ‘deterministic’ signal.
a) True

3. The even part of a signal x(t) is?
a) x(t)+x(-t)
b) x(t)-x(-t)
c) (1/2)*(x(t)+x(-t))
d) (1/2)*(x(t)-x(-t))

Answer: c

4. Which of the following is the odd component of the signal $x(t)=e^{(jt)}$?
a) cost
b) j*sint
c) j*cost
d) sint
Answer: b

5. For a continuous time signal x(t) to be periodic with a period T, then x(t+mT) should be equal to _____
a) x(-t)
b) x(mT)
c) x(mt)
d) x(t)

Answer: d

6. Let $x_1(t)$ and $x_2(t)$ be periodic signals with fundamental periods T1 and T2 respectively. Which of the following must be a rational number for $x(t)=x_1(t)+x_2(t)$ to be periodic?
a) T_1+T_2
b) T_1-T_2
c) T_1/T_2
d) T_1*T_2

Answer: c

7. Let $x_1(t)$ and $x_2(t)$ be periodic signals with fundamental periods T_1 and T_2 respectively. Then the fundamental period of $x(t)=x_1(t)+x_2(t)$ is?
a) LCM of T_1 and T_2

b) HCF of $T_1$and T_2
c) Product of T_1 and T_2
d) Ratio of T_1 to T_2

Answer: a
Explanation: For the sum of $x_1(t)$ and $x_2(t)$ to be periodic the ratio of their periods should be a rational number, then the fundamental period is the LCM of T_1 and T_2.

8. All energy signals will have an average power of _____
a) Infinite
b) Zero
c) Positive
d) Cannot be calculated

Answer: b

9. x(t) or x(n) is defined to be an energy signal, if and only if the total energy content of the signal is a _____
a) Finite quantity
b) Infinite
c) Zero
d) None of the mentioned

Answer: a
Explanation: The energy signal should have a total energy value that lies between 0 and infinity.

10. What is the period of cos2t+sin3t?
a) pi
b) 2*pi
c) 3*pi
d) 4*pi
Answer: b
Explanation: Period of cos2t=(2*pi)/2=pi
Period of sin3t=(2*pi)/3

1. Which of the following is common independent variable for speech signal, EEG and ECG?
a) Time
b) Spatial coordinates
c) Pressure
d) None of the mentioned
View Answer

Answer: a
Explanation: Speech, EEG and ECG signals are the examples of information-bearing signals that evolve as functions of a single independent variable, namely, time.

2. Which of the following conditions made digital signal processing more advantageous over analog signal processing?
a) Flexibility
b) Accuracy
c) Storage
d) All of the mentioned
View Answer

Answer: d
Explanation: Digital programmable system allows flexibility in reconfiguring the DSP operations by just changing the program, as the digital signal is in the form of 1 and 0's it is more accurate and it can be stored in magnetic tapes.

3. Which property does y(t)=x(1-t) exhibit?
a) Time scaling
b) Time shifting
c) Reflecting
d) Time shifting and reflecting
View Answer

Answer: d
Explanation: First the signal x(t) is shifted by 1 to get x(1+t) and it is reflected to get x(1-t). So, it exhibits both time shifting and reflecting properties.

4. If x(n)=(0,1,2,3,3,0,0,0) then x(2n) is?
a) (0,2,4,6,6,0,0,0)
b) (0,1,2,3,3,0,0,0)
c) (0,2,3,0,0,0,0,0)
d) None of the mentioned
View Answer

Answer: c
Explanation: Substitute n=0,1,2… in x(2n) and obtain the values from the given x(n).

5. If x(n)=(0,0,1,2,3,4,0,0) then x(n-2) is?
a) (0,0,2,4,6,8,0,0)
b) (0,0,1,2,3,4,0,0)
c) (1,2,3,4,0,0,0,0)
d) (0,0,0,0,1,2,3,4)
View Answer

Answer: d
Explanation: The signal x(n) is shifted right by 2.

6. If x(n)=(0,0,1,1,1,1,1,0) then x(3n+1) is?
a) (0,1,0,0,0,0,0,0)
b) (0,0,1,1,1,1,0,0)
c) (1,1,0,0,0,0,0,0)

d) None of the mentioned
View Answer

Answer: a
Explanation: First shift the given signal left by 1 and then time scale the obtained signal by 3.

7. If a signal x(t) is processed through a system to obtain the signal $(x(t)^2)$, then the system is said to be _____
a) Linear
b) Non-linear
c) Exponential
d) None of the mentioned
View Answer

Answer: b
Explanation: Let the input signal be 't'. Then the output signal after passing through the system is $y=t^2$ which is the equation of a parabola. So, the system is non-linear.

1. What is single-valued function?
a) Single value for all instants of time
b) Unique value for every instant of time
c) A single pattern is followed by after 't' intervals
d) Different pattern of values is followed by after 't' intervals of time
View Answer

Answer: b
Explanation: Single-valued function means "for every instant of time there exists unique value of the function".

2. In real valued function and complex valued function, time is _____
a) Real
b) Complex
c) Imaginary
d) Not predictable
View Answer

Answer: a
Explanation: Time is an independent variable and it is real valued irrespective of real valued or complex valued function. And time is always real.

3. Discrete time signal is derived from continuous time signal by _____ process.
a) Addition
b) Multiplying
c) Sampling
d) Addition and multiplication
View Answer

Answer: c
Explanation: Sampling is a process wherein continuous time signal is converted to its equivalent discrete time signal. It is given by t = N*t.

4. Even signals are symmetric about the vertical axis.
a) True
b) False
View Answer

Answer: a
Explanation: Signals are classified as even if it has symmetry about its vertical axis. It is given by the equation x (-t) = x (t).

5. If x (-t) = -x (t) then the signal is said to be _____
a) Even signal
b) Odd signal
c) Periodic signal
d) Non periodic signal
View Answer

Answer: a
Explanation: Signals is said to be odd if it is anti- symmetry over the time origin. And it is given by the equation x (-t) = -x (t).

6. Which of the following is true for complex-valued function?
a) X (-t) = x*(t)
b) X (-t) = x(t)
c) X (-t) = – x(t)
d) X (-t) = x*(-t)
View Answer

Answer: a
Explanation: Complex-valued function is said to be conjugate symmetry if its real part is even and imaginary part is odd and it is shown by the equation x(-t) = x*(t).

7. When x(t) is said to be non periodic signal?
a) If the equation x (t) = x (t + T) is satisfied for all values of T
b) If the equation x (t) = x (t + T) is satisfied for only one value of T
c) If the equation x (t) = x (t + T) is satisfied for no values of T
d) If the equation x (t) = x (t + T) is satisfied for only odd values of T
View Answer

Answer: c
Explanation: A signal x (t) is said to be non periodic signal if it does not satisfy the equation x(t) = x(t + T). And it is periodic if it satisfies the equation for all values of T = T0, 2T0, 3T0…

8. Fundamental frequency x[n] is given by _____
a) Omega = 2*pi /N

b) Omega = 2*pi*N
c) Omega = 4*pi *2N
d) Omega = pi / N
View Answer

Answer: a
Explanation: Fundamental frequency is the smallest value of N which satisfies the equation Omega = 2*pi/ N, Where N is a positive integer.

9. Noise generated by an amplifier of radio is an example for?
a) Discrete signal
b) Deterministic signal
c) Random signal
d) Periodic signal
View Answer

Answer: c
Explanation: Random signal is the one which there is uncertainty before its actual occurrence. Noise is a best example for random signal.

10. Energy signal has zero average power and power signal has zero energy.
a) True
b) False
View Answer

Answer: b
Explanation: Energy and power signals are mutually exclusive. Energy signal has zero average power and power signal has infinite energy.

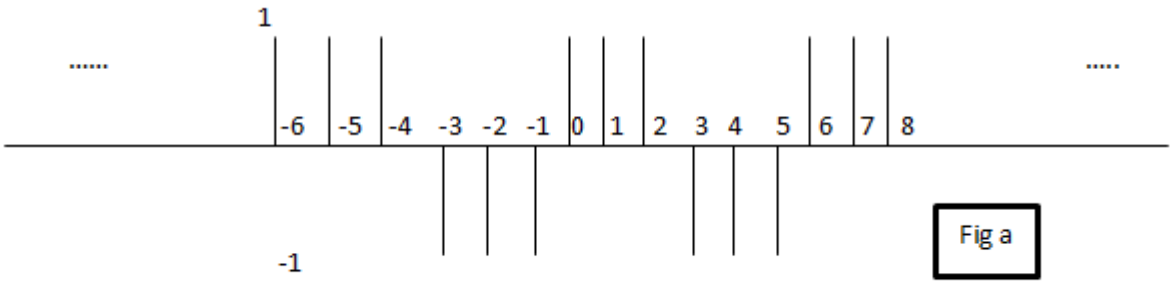


Fig a

11. What is the fundamental frequency of discrete –time wave shown in fig a?
a) π/6
b) π/3
c) 2π/8
d) π
View Answer

Answer: b
Explanation: Omega = 2* π / N. In the given example the number of samples in one period is

N = 6. By substituting the value of N =6 in the above equation then we get fundamental frequency as π/3.

12. Calculate the average power of the discrete-time wave shown in fig a?

a) 1

b) 6

c) 0

d) -1

View Answer

Answer: a

$$P = (1/N) \sum_{n=0}^{N-1} x^2[n], N = 6.$$

Explanation: The given formula is used to calculate average power for Periodic -discrete signal. By substituting the value of N and $x^{2[n]}$ in the given then we get the required answer.

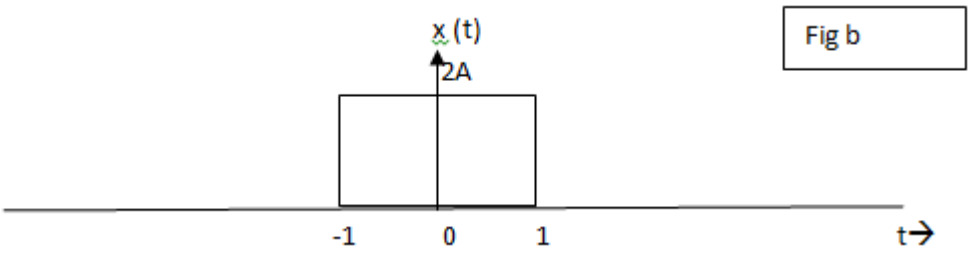


Fig b

13. What is the total energy of rectangular pulse shown in fig b?

a) $8A^2$

b) 4A

c) 2A

d) $4A^2$

View Answer

Answer: a

$$E = \int_{-\infty}^{\infty} x^2(t).\,dt.$$

Explanation: The total energy of the rectangular pulse can be found by integrating the square of the signal. Basically energy is given by area under the curve.

14. What is the total power of the rectangular pulse shown in fig b?

a) 0

b) $8A^2$

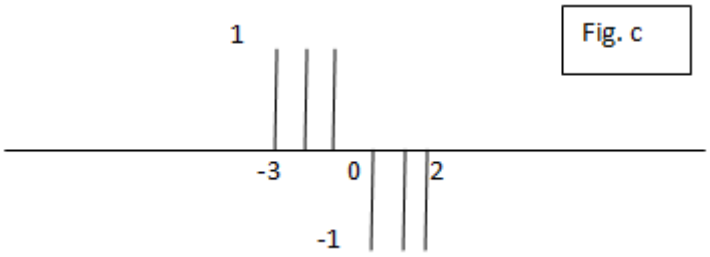
c) ∞

d) 2A

View Answer

Answer: a
Explanation: Energy signals have zero power and finite energy. Figure b is an example of an energy signal. This is one of the definition/ properties of the energy signal.

15. What is the total energy of the signal shown in fig c?



a) 6
b) 0
c) 3
d) 1
View Answer

Answer: a
Explanation: The given figure is an example of an energy signal hence the energy of a discrete-time signal is given by the equation $E = \sum x^2[n]$.

1. Which of the following is an example of amplitude scaling?
a) Electronic amplifier
b) Electronic attenuator
c) Both amplifier and attenuator
d) Adder
View Answer

Answer: c
Explanation: Amplitude scaling refers to multiplication of a constant with the given signal. It is given by y (t) = a x (t). It can be both increase in amplitude or decrease in amplitude.

2. Resistor performs amplitude scaling when x (t) is voltage, a is resistance and y (t) is output current.
a) True
b) False
View Answer

Answer: b
Explanation: The given statement is not true. The relation between voltage, current and resistance is given by V = IR. Comparing with equation y (t) = a x (t), we can see that y (t) is the output voltage for given current x (t) with resistance R.

3. Which of the following is an example of physical device which adds the signals?
a) Radio
b) Audio mixer

c) Frequency divider
d) Subtractor
View Answer

Answer: b
Explanation: Audio mixer is a device which combines music and voice signals. It is given by Y (t) = x1 (t) + x2 (t).

4. AM radio signal is an example for _____
a) y (t) = a x (t)
b) y (t) = x1 (t) + x2 (t)
c) y (t) = x1 (t) * x2 (t)
d) y (t) = -x(t)
View Answer

Answer: c
Explanation: AM radio signal is an example for y (t) = x1 (t) * x2 (t) where, x1 (t) consists of an audio signal plus a dc component and x2 (t) is a sinusoidal signal called carrier wave.

5. Which of the passive component performs differentiation operation?
a) Resistor
b) Capacitor
c) Inductor
d) Amplifier
View Answer

Answer: c
Explanation: Inductor performs differentiation. It is given by y (t) = L d/dt i(t) where, I (t) denotes current flowing through an inductor of inductance L.

6. Which of the component performs integration operation?
a) Resistor
d) Diode
c) Capacitor
d) Inductor
View Answer

Answer: c
Explanation: Capacitor performs integration. V (t) developed across capacitor is given by v (t) = (1/C)* $\int_{-\infty}^{t}$ i (∂).d∂, I (t) is the current flowing through a capacitor of capacitance C.

7. Time scaling is an operation performed on _____
a) Dependent variable
b) Independent variable
c) Both dependent and independent variable
d) Neither dependent nor independent variable
View Answer

Answer: b
Explanation: Time scaling is an example for operations performed on independent variable time.
It is given by y (t) = x (at).

8. Y (t) = x (2t) is _____
a) Compressed signal
b) Expanded signal
c) Shifted signal
d) Amplitude scaled signal by a factor of 2
View Answer

Answer: a
Explanation: By comparing the given equation with y (t) = x (at) we get a=2. If a>1 then it is compressed version of x (t).

9. Y (t) = x (t/5) is _____
a) Compressed signal
b) Expanded signal
c) Time shifted signal
d) Amplitude scaled signal by factor 1/5
View Answer

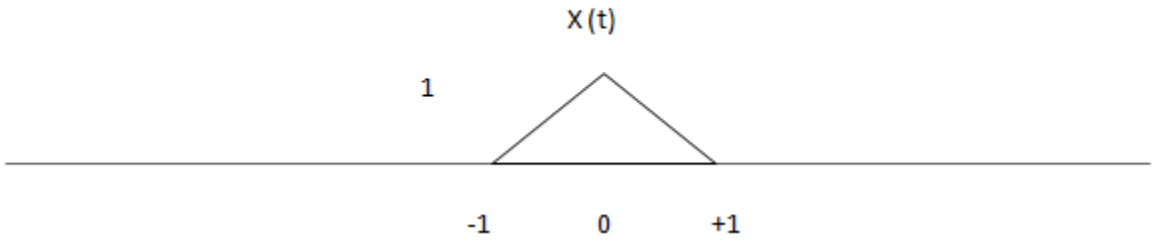
Answer: b
Explanation: y (t) = x (at), comparing this with the given expression we get a = 1/5. If 0<a<1 then it is expanded (stretched) version of x (t).

10. In discrete signal, if y [n] = x [k*n] and k>1 then _____
a) Some samples are lost from x [n]
b) Some samples are added to x [n]
c) It has no effect on samples
d) Samples will be increased with factor k
View Answer

Answer: a
Explanation: For discrete time signal y [n] = x [k*n] and k>1, it will be compressed signal and some samples will be lost. The samples lost will not violate the rules of sampling theorem.

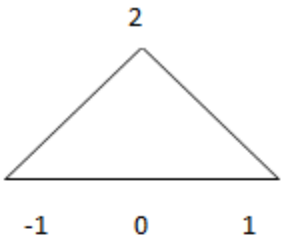
This set of Signals & Systems Interview Questions and Answers for freshers focuses on “Basic Operations on Signals – 2”.

Figure 1

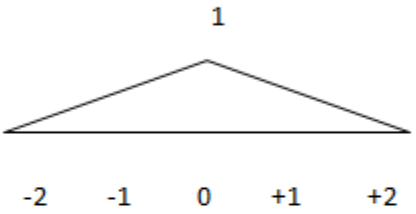


1. Considering Figure 1, sketch y= 2* x (t).

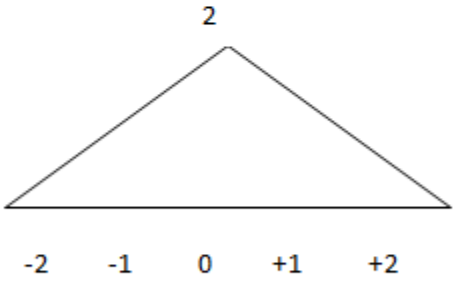
a)



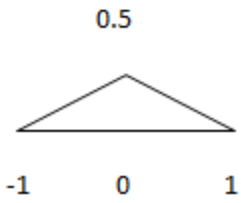
b)



c)



d)



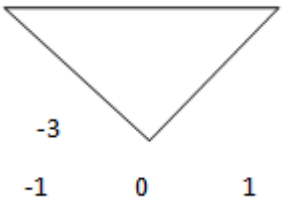
View Answer

Answer: a

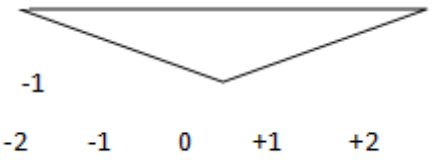
Explanation: Y (t) = 2*x (t) is an example for amplitude scaling. Here amplitude is scaled by a factor 2.

2. Considering Figure 1, sketch y= -3* x (t).

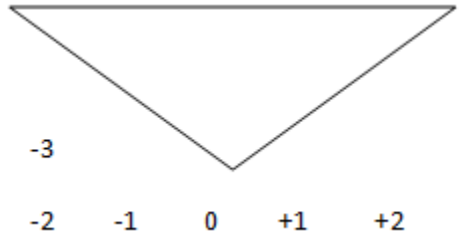
a)



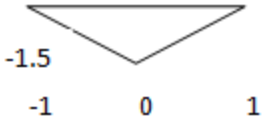
b)



c)



d)

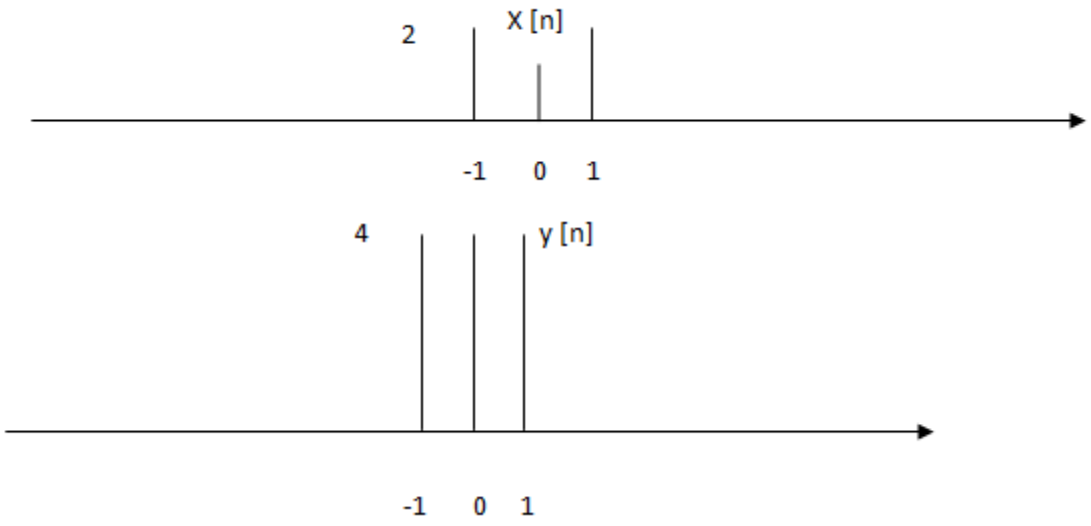


View Answer

Answer: a

Explanation: Y (t) = -3*x (t) is an example for amplitude scaling. Here amplitude is scaled by a factor -3.

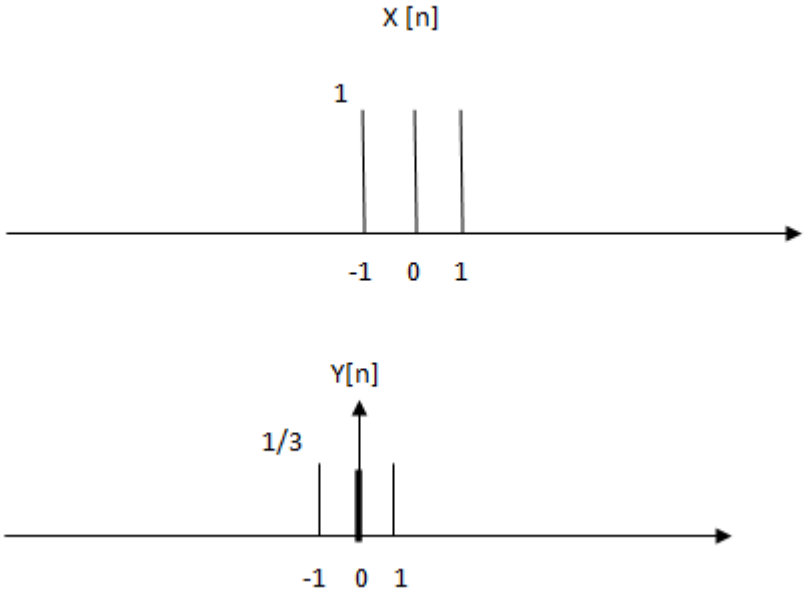
3. In the following diagram, X [n] and y [n] are related by _____



a) Y [n] = 2*x [n]
b) Y [n] = -2*x [n]
c) Y [n] = x [2n]
d) Y [n] = x [-2n]
View Answer

Answer: a
Explanation: Y [n] = 2*x [n] is an example for amplitude scaling of discrete time signal. The given figure is an example for 2*x [n] hence Y [n] = 2*x [n] is correct.

4. X [n] and y [n] is as shown below, the relationship between x [n] and y [n] is given by _____



a) X [n] = y [n]/3
b) X [n] = 3* y [n]
c) Y [n] = x [n]/3
d) Y [n] = 3*x [n]
View Answer

Answer: c
Explanation: The given y [n] is amplitude scaling of a discrete time signal by a factor 1/3. Hence the amplitude is reduced by 1/3.

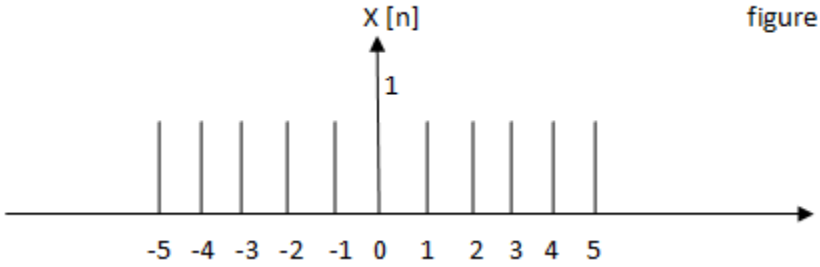
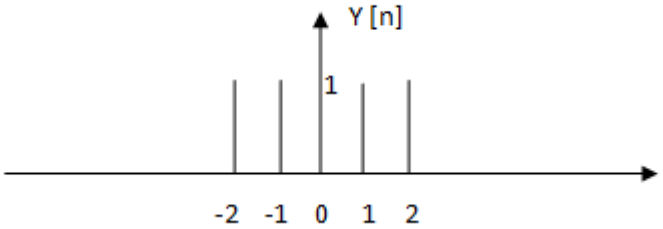


figure 3

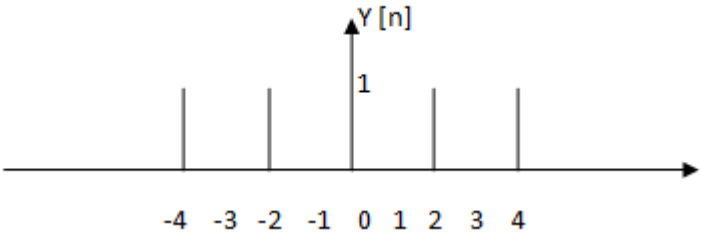
5. Considering figure 3 above, is the following figure true for y [n] = x [2n]?



a) True
b) False
View Answer

Answer: a
Explanation: X [2n] is an example of time scaling. For discrete time signal x [k*n], k>1 the samples will be lost.

6. Considering figure 3 above, is the following figure true for y [n] = x [n/2]?



a) True
b) False
View Answer

Answer: b
Explanation: X [n/2] is an example for time scaling by factor ½ and it will be a stretched signal. The discrete time signal should extend from -10 to 10.

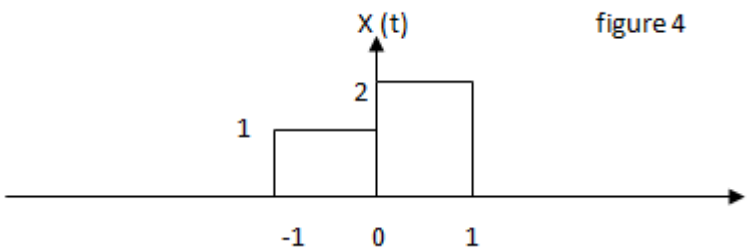
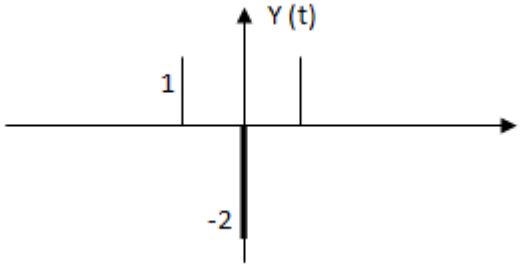


figure 4

7. Consider figure 4, is the given y (t) an integration of x (t)?
a) Y (t) = ∫x (t).dt
b) Y (t) = $\int x^2$ (t).dt
c) Y (t) = 3* ∫x (t).dt
d) Y (t) = 3* $\int x^2$ (t).dt
View Answer

Answer: a
Explanation: The given y (t) is integral of x (t) and amplitude 3 remains constant for t>1.
It is because of the properties of integration.

8. . Consider figure 4, is the given y (t) a differentiation of x (t)?



a) Y (t) = $\frac{dx(t)}{dt}$

b) Y (t) = $\frac{-2dx(t)}{dt}$

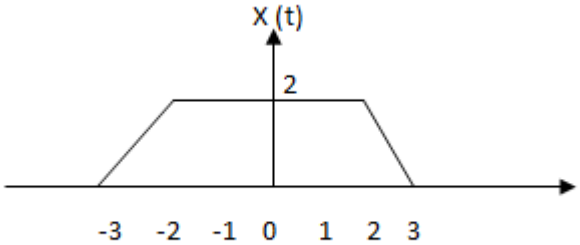
c) Y (t) = $\frac{dx(-t)}{dt}$

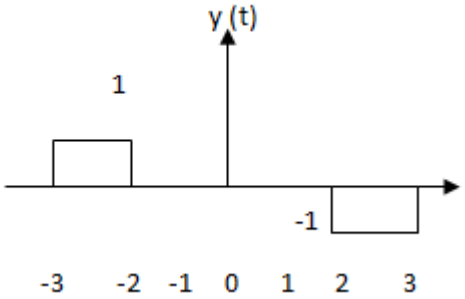
d) Y (t) = ∫x (t).dt

View Answer

Answer: a
Explanation: The given y (t) is differentiation of x (t) and hence we have impulses at -1, 0 and 1.

9. The given pair x (t) and y (t) is _____



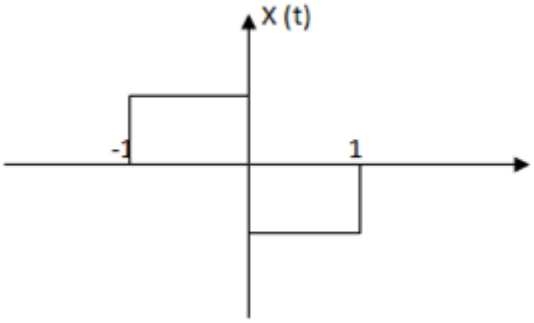


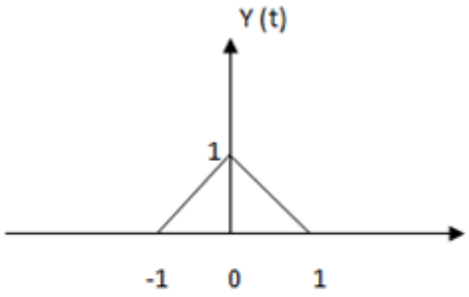
a) Y (t) = d/dt (x (t))
b) Y (t) = ∫x (t).dt
c) Y (t) = x (t) -1

d) Y (t) = x (t) /2
View Answer

Answer: a
Explanation: The given pair x (t) and y (t) is related by y (t) = d/dt (x (t)). From -2 to 2 we have Y (t) is zero because differentiation of constant is zero.

10. The given pair x (t) and y (t) is related by _____





a) Y (t) = d/dt (x (t))
b) Y (t) = x (t) + 1
c) Y (t) = ∫x (t) .dt
d) Not related
View Answer

Answer: c
Explanation: The given pair x (t) and y (t) is related by Y (t) = ∫x (t) .dt. The integral of x (t) gives the Y (t). Y (t) = 0 for t > 1.

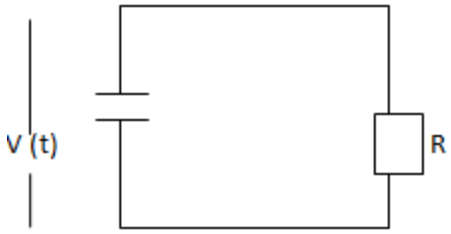
1. The general form of real exponential signal is_____
a) X (t) = be^{at}
b) X (t) = $(b+1)e^{at}$
c) X (t) = b (at)
d) X (t) = $be^{(a+1)t}$
View Answer

Answer: a
Explanation: X (t) = be^{at} is the most general way of representing the exponential signals where both b and a are real parameters.

2. In the equation x (t) = be^{at} if a < 0, then it is called _____
a) Growing exponential
b) Decaying exponential
c) Complex exponential
d) Both Growing and Decaying exponential
View Answer

Answer: b
Explanation: If a > 0 in x (t) = be^{at} it is called growing exponential and if <0 it is called decaying exponential. Hence Decaying exponential is correct.

3. In the below figure if R value is increased then which of the following is true?



a) Slower the rate of decay of v (t)
b) Greater the rate of decay of v (t)
c) Decay rate is independent of R
d) Decay rate depends only on the capacitor value
View Answer

Answer: a
Explanation: In the circuit shown voltage across capacitor decays exponentially with time at a rate determined by time constant RC. Hence the larger the resistor, the slower will be the rate of decay of v (t) with time.

4. The time period of continuous-time sinusoidal signal is given by _____
a) T = 2π / w
b) T = 2π / 3w
c) T = π / w
d) T = π / 2w
View Answer

Answer: a
Explanation: X (t) = A cos (wt+ϕ) is the continuous-time sinusoidal signal and its period is given by
T = 2π / w where w is the frequency in radians per second.

5. The natural angular frequency of the parallel LC circuit is?
a) $wo = \frac{1}{\sqrt{LC}}$
b) $wo = \frac{2\pi}{\sqrt{LC}}$
c) $wo = \frac{\pi}{\sqrt{LC}}$
d) $wo = \frac{1}{\sqrt{\pi LC}}$
View Answer

Answer: a
Explanation: Wo is the natural angular frequency and for parallel LC circuit it is given by wo=$^{1}/_{\sqrt{LC}}$ where, L is value of inductor and C is value of capacitor.

6. X [n] = 2 cos (2n) is periodic or not?
a) Periodic with period 2n
b) Periodic with period 2π
c) Periodic with period 2
d) Non periodic
View Answer

Answer: d
Explanation: The given signal x [n] is non periodic as it doesn't satisfy the equation $w=^{2\pi m}/_{N}$ where, N is fundamental period and m is an integer.

7. Check whether x [n] = 7 sin (6πn) is periodic and if it is period calculate its fundamental period?
a) Periodic with fundamental period 6π
b) Periodic with fundamental period 3
c) Periodic with fundamental period 1
d) Non periodic
View Answer

Answer: c
Explanation: X [n] = 7 sin (6πn) is a periodic discrete time signal with period 1. By substituting w = 6π and m=3 in $w=^{2\pi m}/_{N}$ we get N =1.

8. Find the smallest angular frequency for which the discrete time signal with fundamental period N=8 would be periodic?
a) $^{\pi}/_{4}$
b) $^{\pi}/_{2}$
c) $^{3\pi}/_{4}$
d) $^{\pi}/_{16}$
View Answer

Answer: a
Explanation: By substituting N=8 and m=1 in the equation $w=^{2\pi m}/_{N}$ we get the smallest angular frequency as $^{\pi}/_{4}$.

9. Euler's identity $e^{j\theta}$ is expanded as _____
a) cos θ + j sin θ
b) cos θ – j sin θ
c) cos θ + j sin 2θ
d) cos 2θ+j sinθ
View Answer

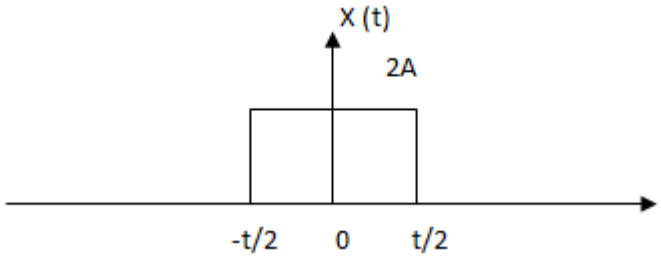
Answer: a
Explanation: The complex exponential $e^{j\theta}$ is expanded as cos θ + j sin θ and is called Euler's identity with cos θ as real part sin θ as imaginary part.

10. Exponentially damped sinusoidal signal is _____
a) Periodic

b) Non periodic
c) Insufficient information
d) Maybe periodic
View Answer

Answer: b
Explanation: Exponentially damped sinusoidal signal of any kind is not periodic as it does not satisfy the periodicity condit

1. Mathematical representation of given rectangular pulse is _____



a) X (t) = {2A, t/2 < 0 < -t/2
b) X (t) = {2A, -t/2 < 0 < t/2
c) X (t) = {2A, 0 <= |t| <= t/2
{0, |t| > t/2
d) X (t) = {2A, 0 <|t| < t/2
{0, |t| > t/2
View Answer

Answer: c
Explanation: The given rectangular pulse is of amplitude 2A for the time interval –t/2 to t/2 and zero otherwise.

2. If $x[n] = \begin{cases} 1, 0 \leq n \leq 4 \\ 0, \ otherwise \end{cases}$ describe x [n] as superposition of two step functions.
a) X [n] = u [n] – u [n-5].
b) X [n] = u [n] + u [n-5].
c) X [n] = u [n-5] – u [n].
d) X [n] = u [n-5] + u [n].
View Answer

Answer: a
Explanation: X [n] will be of amplitude for the interval 0 to 4 and zero otherwise. It can be obtained by the equation x [n] = u [n] – u [n-5].

3. Discrete-time version of unit impulse is defined as _____

a) $\partial\,[n] = \begin{cases} 1, & n = 0 \\ 0, & n \neq 0 \end{cases}$

b) $\partial\,[n] = \begin{cases} 1, & n \neq 0 \\ 0, & n = 0 \end{cases}$

c) $\partial\,[n] = \{\, 1, for\ all\ n$

d) $\partial\,[n] = \begin{cases} A, & n = 0 \\ 0, & n \neq 0 \end{cases}$

View Answer

Answer: a
Explanation: Unit impulse is an elementary signal with zero amplitude everywhere except at n = 0.

4. Which of the following is not true about unit impulse function?

a) $\partial\,[n] = \begin{cases} 1, & n = 0 \\ 0, & n \neq 0 \end{cases}$

b) $\partial(t) = 0\ , for\ t \neq 0$

c) $\int_{-\infty}^{\infty} \partial(t)dt = 1$

d) $\int_{-\infty}^{\infty} \partial(t)dt = 0$

View Answer

Answer: d
Explanation: One option gives the definition of discrete-time version of impulse function, other options gives continuous-time representation of impulse function.

5. The step function u (t) is integral of _____ with respect to time t.
a) Ramp function
b) Impulse function
c) Sinusoidal function
d) Exponential function
View Answer

Answer: b
Explanation: Step function is an integral of impulse function and conversely, impulse is the derivative of step function u (t).

6. The area under the pulse defines _____ of the impulse.
a) Strength
b) Energy
c) Power

d) Duration
View Answer

Answer: a
Explanation: The area under the pulse defines strength of the impulse and the strength of the impulse is denoted by the label next to the arrow.

7. Unit impulse ∂(t) is _____ of time t.
a) Odd function
b) Even function
c) Neither even nor odd function
d) Odd function of even amplitude
View Answer

Answer: b
Explanation: For an impulse function, ∂(-t)= ∂(t). Hence unit impulse is an even function of time t.

8. Shifting property of impulse ∂(t) is given by _____

a) $\int_{-\infty}^{\infty} x(t)\ \partial(t-to)\ dt = x(to)$

b) $\int_{-\infty}^{\infty} x(t)\ \partial(t-to)\ dt = x(t)$

c) $\int_{-\infty}^{\infty} x(t-to)\ \partial(t)\ dt = x(to)$

d) $\int_{-\infty}^{\infty} x(t)\ \partial(t-to)\ dt = \partial(to)$

View Answer

Answer: a
Explanation: X (t) be a function and the product of x (t) with time shifted delta function ∂(t – to) gives x(to), this is referred to as shifting property of impulse function.

9. ∂(at) = $^{1}\!/_{a}$ ∂(t), this property of unit impulse is called _____
a) Time shifting property
b) Time scaling property
c) Amplitude scaling property
d) Time reversal property
View Answer

Answer: b
Explanation: Impulse function exhibits shifting property, time scaling property. And time scaling property is given by∂(at) = $^{1}\!/_{a}$ ∂(t).

10. Which of the following is not true about the ramp function?

a) $r(t) = \begin{cases} t, & t \geq 0 \\ 0, & t < 0 \end{cases}$

b) r (t) = t u (t)
c) Ramp function with unit slope is integral of unit step
d) Integral of unit step is a ramp function of unit slope
View Answer

Answer: d
Explanation: The impulse function is derivative of the step function. In the same way the integral of step function is a ramp function of unit slope.
∫u(t) = r(t).

1. Is the system y(t) = Rx(t), where R is a arbitrary constant, a memoryless system?
a) Yes
b) No
View Answer

Answer: a
Explanation: The output of the system depends on the input of the system at the same time instant. Hence, the system has to be memoryless.

2. Does the following discrete system have the parameter of memory, y[n] = x[n-1] + x[n] ?
a) Yes
b) No
View Answer

Answer: a
Explanation: y[n] depends upon x[n-1], i.e at the earlier time instant, thus forcing the system to have memory.

3. y[t]= ∫x[t],t ranges from 0 to t. Is the system a memoryless one?
a) Yes
b) No
c) Both memoryless and having memory
d) None of the Mentioned
View Answer

Answer: b
Explanation: While evaluating the integral, it becomes imperative to know the values of x[t] from 0 to t, thus making the system requiring memory.

4. y(t) = sin(x(t-1)) : Comment on its memory aspects.
a) Having memory
b) Needn’t have memory
c) Memoryless system
d) Time invariant system
View Answer

Answer: a
Explanation: The output at any time t = A, requires knowing the input at an earlier time, t = A – 1, hence making the system require memory aspects.

5. Construct the inverse system of y(t) = 2x(t)
a) y(t) = 0.5x(t)
b) y(t) = 2x(t)
c) y(2t) = x(t)
d) y(t) = x(2t)
View Answer

Answer: a
Explanation: Now, y(t) = 2x(t) => x(t) = 0.5*y(t)
Thus, reversing x(t) <-> y(t), we obtain the inverse system: y(t) = 0.5x(t)

6. $y(t) = x^{2(t)}$. Is y(t) = sqrt(x(t)) the inverse of the first system?
a) Yes
b) No
c) Inverse doesn't exist
d) Inverse exist
View Answer

Answer: b
Explanation: We cannot determine the sign of the input from the second function, thus, the output doesn't replicate the input. Thus, the second function is not an inverse of the first one.

7. Comment on the causality of y[n] = x[-n].
a) Time invariant
b) Causal
c) Non causal
d) Time varying
View Answer

Answer: c
Explanation: For positive time, the system may seem to be causal. However, for negative time, the output depends on time at a positive sign, thus being in the future, enforcing non causality.

8. y(t) = x(t-2) + x(2-t). Comment on its causality:
a) Causal
b) Time variant
c) Non causal
d) All of the mentioned
View Answer

Answer: c
Explanation: For a time instant existing between 0 and 1, it would depend on the input at a time in the future as well, hence being non causal.

9. Comment on the causality of y[n] = n*x[n].
a) Time invariant
b) Time varying
c) Non causal
d) Causal
View Answer

Answer: d
Explanation: For positive time, the system may seem to be causal. For negative time, the output depends on the same time instant, thus making it causal.

10. Comment on the linearity of y[n] = n*x[n].
a) Linear
b) Only additive
c) Not scalable
d) Non linear
View Answer

Answer: d
Explanation: The function obeys the scaling/homogeneity property, but doesn’t obey the additivity property, thus not being l