

1. For a unit step function the value of the function should be:
- a) 0 for $t < 0$ and 1 for $t \geq 0$
 - b) 0 for $t < 0$ and -1 for $t \geq 0$
 - c) 0 everywhere except for the 0 itself
 - d) None of the above

Answer: (a)

2. A system which is linear is said to obey the rules of:
- a) Scaling
 - b) Additivity
 - c) Both scaling and additivity
 - d) None of the above

Answer: (c)

3. A time invariant system is a system whose output:
- a) Increases with a delay in input
 - b) Remains same with a delay in input
 - c) Decreases with a delay in input
 - d) Vanishes with a delay in input

Answer: (b)

4. Signal is defined as:
- a) A quantitative description of a physical phenomenon, event or the process.
 - b) A function represents a physical quantity or variable containing the information about the behavior and nature of the phenomenon.
 - c) A device or a set of rules defining the functional relation between the input and output.
 - d) Both (a) and (b)

Answer: (d)

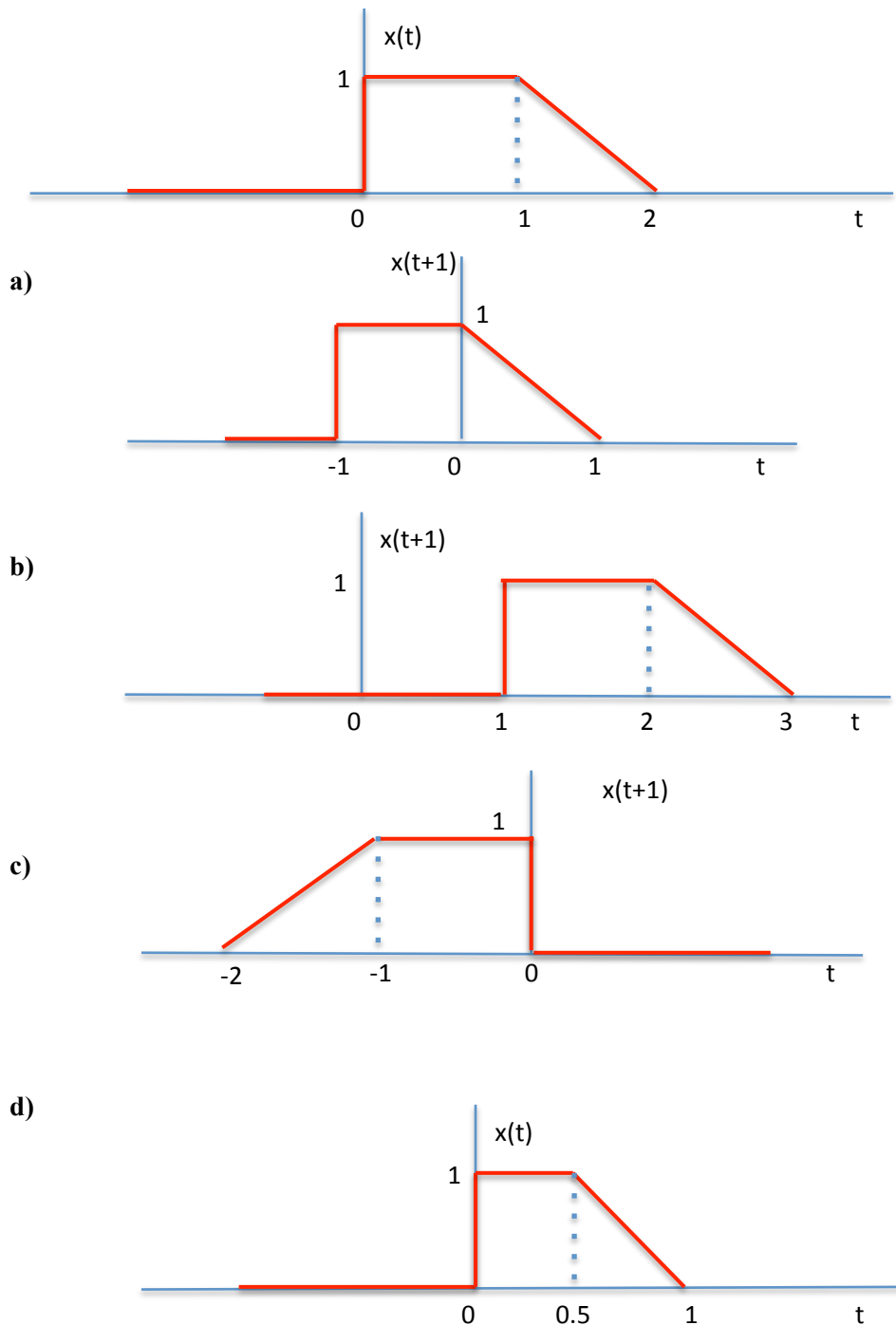
5. In a time shift operation, if $t_0 > 0$ then:
- a) The time shift is known as advance.
 - b) The time shift is known as delay.
 - c) The signal is decimated.
 - d) None of the above.

Answer: (b)

6. If $0 < a < 1$, the time scale of the resultant signal is:
- a) Decimated.
 - b) Speedup.
 - c) Slowed down.
 - d) None of the above.

Answer: (c)

7. For the signal shown below, if we shift it with $t_0 = -1$, then the result will be:



Answer: (a)

8. A system is said to be defined as non-causal, when:

- a) The output at the present depends on the input at an earlier time.
- b) The output at the present does not depend on the factor of time at all.
- c) The output at the present depends on the input at a time instant in the future.
- d) The output at the present depends on the input at the current time.

Answer: (c)

9. Is the function $y[n] = x[n-1] - x[n-4]$ memoryless?
- a) The system is memoryless.
 - b) The system needs to have memory, so it is with memory.
 - c) The system is neither memoryless nor with memory.
 - d) None of the above.

Answer: (b)

10. In real exponential function if $\alpha > 0$ then the graph will:
- a) Decrease exponentially.
 - b) Grows exponentially.
 - c) Increase exponentially.
 - d) Both (b) and (c).

Answer: (d)

11. A signal $x(t)$ is said to be power signal if:
- a) $0 < P < \infty$ and $E = \infty$
 - b) $0 < P < E$ and $E = 0$
 - c) $0 < P < \infty$ and $E = 0$
 - d) None of the above

Answer: (a)

12. The unit impulse function is also known as:
- a) Dirac Delta function.
 - b) Step function.
 - c) Both (a) and (b).
 - d) None of the above.

Answer: (a)

13. A signal cannot be both an energy signal and a power signal.
- a) False.
 - b) True.
 - c) May be.
 - d) None of the above.

Answer: (b)

14. The discrete-time unit impulse function $\delta[n]$ is defined as:
- a) $\delta[n] = \begin{cases} 0 & \text{for } n = 0 \\ 1 & \text{for } n \neq 0 \end{cases}$
 - b) $\delta[n] = \begin{cases} 1 & \text{for } n = 0 \\ 0 & \text{for } n \neq 0 \end{cases}$
 - c) $\delta[n] = \begin{cases} 1 & \text{for } n > 0 \\ 0 & \text{for } n < 0 \end{cases}$
 - d) None of the above.

Answer: (b)

15. The convolution of $x(t)$ and $h(t)$ is defined by:

- a) $y(t) = \int_{-\infty}^{\infty} x(\tau)h(t - \tau)d\tau$
- b) $y(t) = \int_{-\infty}^{\infty} [x(\tau) + h(t - \tau)]d\tau$
- c) $y(t) = \int_{-\infty}^{\infty} x(\tau)h(t - \tau)d\tau$
- d) None of the above.

Answer: (c)

16. If the output is a scaled version of its input, then the input function is called as:

- a) Eigenvalue of the system.
- b) Eigenfunction of the system.
- c) Both (a) and (b).
- d) None of the above.

Answer: (b)

17. Memory in a discrete time system is analog if:

- a) Energy storage in a continuous time system.
- b) Memory in a continuous time system.
- c) Sampled memory of a continuous time LTI system.
- d) None of the above.

Answer: (a)

18. The system $y(t) = x(t) + \frac{1}{3}x(t - 3)$ is:

- a) Non-causal system.
- b) Causal system.
- c) Partly A and partly B.
- d) None of the above.

Answer: (b)

19. Two sequences $x_1(n)$ and $x_2(n)$ are related by $x_2(n) = x_1(-n)$. In the z-domain, their ROC's are:

- a) The same.
- b) Reciprocal of each other.
- c) Negative of each other.
- d) None of the above.

Answer: (b)

20. _____ data have discrete states and take discrete values.

- a) Digital.
- b) Analog.
- c) (a) or (b) .
- d) None of the above.

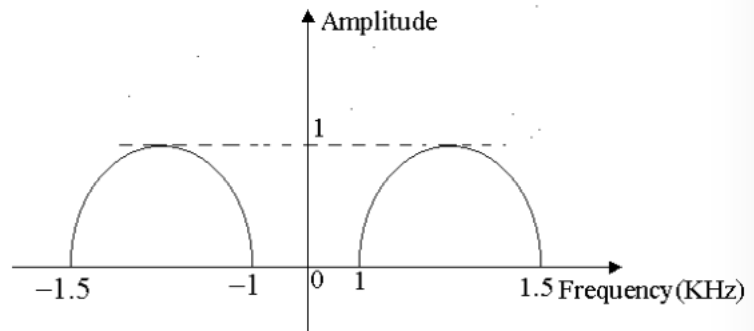
Answer: (a)

21. The Fourier transform (FT) of a function $x[n]$ is $X(e^{j\omega})$. The FT of $nx[n]$ will be:

- a) $\frac{dx(t)}{dt}$
- b) $jfX(e^{j\omega})$.
- c) $j\frac{dX(e^{j\omega})}{d\omega}$.
- d) None of the above.

Answer: (c)

22. An analog signal has the spectrum shown below. The minimum sampling rate needed to completely represent this signal is:



- a) 1 KHz.
- b) 2 KHz.
- c) 3 KHz.
- d) None of the above.

Answer: (a)

23. The impulse response of a system is $h[n] = a^n u[n]$. The condition for the system to be BIBO stable is:

- a) "a" is real and positive.
- b) "a" is real and negative.
- c) $|a| > 1$.
- d) $|a| < 1$.

Answer: (d)

24. If R_1 is the region of convergence of $x(n)$ and R_2 is the region of convergence of $y(n)$, then the region of convergence of $x(n)$ convoluted $y(n)$ is:

- a) $R_1 + R_2$.
- b) $R_1 - R_2$.
- c) $R_1 \cap R_2$.
- d) $R_1 \cup R_2$.

Answer: (c)

25. The continuous time system described by $y(t) = x(t^2)$ is:

- a) Causal, linear and time varying.
- b) Causal, non-linear and time varying.
- c) Non-causal, non-linear and time-invariant.
- d) Non-causal, linear and time-invariant.

Answer: (d)

26. $x[n] = a^{|n|}$, $|a| < 1$ is:

- a) An energy signal.
- b) A power signal.
- c) Neither energy nor a power signal.
- d) None of the above.

Answer: (a)

27. A band pass signal extends from 1 KHz to 2 KHz. The minimum sampling frequency needed to retain all information in the sampled signal is:

- a) 1 KHz.
- b) 2 KHz.
- c) 3 KHz.
- d) None of the above.

Answer: (b)

28. The region of convergence of the z-transform of the signal $2^n u[n] - 3^n u[-n - 1]$ is:

- a) $|z| > 1$.
- b) $|z| < 1$.
- c) $2 < |z| < 3$.
- d) Does not exist.

Answer: (c)

29. The number of possible regions of convergence of the function $\frac{(e^{-2}-2)z}{(z-e^{-2})(z-2)}$ is:

- a) 1.
- b) 3.
- c) 2.
- d) None of the above.

Answer: (b)

30. Given a unit step function $u(t)$, its time-derivative is:

- a) A unit impulse.
- b) Another step function.
- c) A unit ramp function.
- d) None of the above.

Answer: (a)

31. The frequency response of a system with $h[n] = \delta[n] - \delta[n - 1]$ is given by:

- a) $\delta(\omega) - \delta(\omega - 1)$.
- b) $u(\omega) - u(\omega - 1)$.
- c) $1 - e^{-j\omega}$.
- d) $1 - e^{j\omega}$.

Answer: (b)

32. z-transform converts convolution of time-signals to:

- a) Multiplication.
- b) Addition.
- c) Division.
- d) None of the above.

Answer: (a)

33. The Fourier transform of $u[n]$ is:

- a) $\frac{1}{1 - e^{-\omega}}$.
- b) $\frac{1}{1 - e^{-j\omega}}$.
- c) $\frac{1}{j2\pi f}$.
- d) None of the above.

Answer: (d)

34. The system having input $x[n]$ related to output $y[n]$ as $y[n] = \log_{10}|x[n]|$ is:

- a) Nonlinear, causal, not stable.
- b) Nonlinear, non-causal, not stable.
- c) Nonlinear, causal, stable.
- d) None of the above.

Answer: (c)

35. To obtain $x(4 - 2n)$ from the given signal $x[n]$, the following procedure (or priority) rule is used for operations on the independent variable n :

- a) Time scaling \rightarrow Time shifting \rightarrow Reflection
- b) Time shifting \rightarrow Time scaling \rightarrow Reflection
- c) Reflection \rightarrow Time shifting \rightarrow Time scaling.
- d) None of the above.

Answer: (b)

36. The unit step-response of a system with impulse response $h[n] = \delta[n] - \delta[n - 1]$ is:

- a) $\delta[n]$.
- b) $\delta[n - 1]$.
- c) $u[n]$.
- d) None of the above.

Answer: (a)

37. The ROC of the z-transform of the signal $x[n] = \{2,1,1,2\}; n(0) = 1$ is:

- a) All z , except $z = 0$.
- b) All z , except $z = \infty$.
- c) All z , except $z = 0$ and $z = \infty$.
- d) None of the above.

Answer: (c)

38. A continuous-time periodic signal $x(t)$, having a period T , is convolved with itself. The resulting signal is:

- a) Not periodic.
- b) Periodic having a period T .
- c) Periodic having a period $2T$.
- d) None of the above.

Answer: (b)

39. If the Fourier series coefficients of a signal are periodic then the signal must be:

- a) Continuous-time, periodic.
- b) Continuous-time, non periodic.
- c) Discrete-time, non periodic.
- d) Discrete-time, periodic.

Answer: (d)

40. Let $H(e^{j\omega})$ be the frequency response of a discrete-time LTI system, and $H_1(e^{j\omega})$ be the frequency response of its inverse. Then:

- a) $H(e^{j\omega})H_1(e^{j\omega}) = 1$.
- b) $H(e^{j\omega})H_1(e^{j\omega}) = \delta(\omega)$.
- c) $H(e^{j\omega}) * H_1(e^{j\omega}) = \delta(\omega)$.
- d) None of the above.

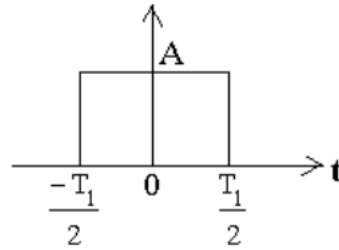
Answer: (a)

41. The transfer function of a stable system is $H(z) = \frac{1}{1-0.5z^{-1}} + \frac{1}{1-2z^{-1}}$. Its impulse response will be:

- a) $(0.5)^n u[n] - (2)^n u[n]$.
- b) $-(0.5)^n u[n-1] + (2)^n u[n]$.
- c) $(0.5)^n u[n] - (2)^n u[-n-1]$.
- d) None of the above.

Answer: (c)

42. The average power of the following signal is:



- a) $\frac{A^2}{2}$.
- b) A^2 .
- c) $A^2 T_1$.
- d) None of the above.

Answer: (c)

43. Convolution is used to find:

- a) The impulse response of an LTI system.
- b) Frequency response of a system.
- c) The phase response of a LTI system.
- d) The time response of a LTI system.

Answer: (d)

44. The Fourier transform of a rectangular pulse is:

- a) Sinc function.
- b) Another rectangular pulse.
- c) Triangular pulse.
- d) None of the above.

Answer: (a)

45. The property of Fourier transform which states that the compression in time domain is equivalent to expansion in the frequency domain is:

- a) Duality.
- b) Frequency shifting.
- c) Scaling.
- d) None of the above.

Answer: (c)

46. What is the Nyquist frequency for the signal $x(t) = 3 \cos 50\pi t + 10 \sin 300\pi t - \cos 100\pi t$?

- a) 100 Hz.
- b) 300 Hz.
- c) 60 Hz.
- d) None of the above.

Answer: (b)

47. The function which has its Fourier transform, Laplace transform and Z-transform unity is:

- a) Gaussian.
- b) Sinc.
- c) Pulse.
- d) Impulse.

Answer: (d)

48. The z-transform of $\delta[n - m]$ is:

- a) z^{-m} .
- b) z^m .
- c) $\frac{1}{z}$.
- d) None of the above.

Answer: (a)

49. The area under the curve $\int_{-\infty}^{\infty} \delta(t) dt$ is:

- a) ∞ .
- b) Unity.
- c) 0.
- d) None of the above.

Answer: (b)

50. For a stable system:

- a) $|z| > 1$.
- b) $|z| = 1$.
- c) $|z| < 1$.
- d) None of the above.

Answer: (c)

51. Let $y[n]$ denote the convolution of $h[n]$ and $g[n]$, where $h[n] = \left(\frac{1}{2}\right)^n u[n]$ and $g[n]$ is a causal sequence. If $y[0] = 1$ and $y[1] = 1/2$, then $g[1]$ equals:

- a) 0.
- b) $\frac{1}{2}$.
- c) 1.
- d) None of the above.

Answer: (a)

52. The input $x(t)$ and output $y(t)$ of a system are related as $y(t) = \int_{-\infty}^t x(\tau) \cos(3\tau) d\tau$. The system is:
- a) Time-invariant and stable.
 - b) Stable and not time-invariant.
 - c) Time-invariant and not stable.
 - d) None of the above.

Answer: (d)

53. The period of the signal $x(t) = 8 \sin\left(0.8\pi t + \frac{\pi}{4}\right)$ is:
- a) $0.4\pi s$.
 - b) $0.8\pi s$.
 - c) $2.5 s$.
 - d) None of the above.

Answer: (c)

54. A cascade of three Linear Time Invariant systems is causal and unstable. From this, we conclude that:
- a) Each system in the cascade is individually causal and unstable.
 - b) At least one system is unstable and at least one system is causal.
 - c) At least one system is causal and all systems are unstable.
 - d) The majority is unstable and the majority is causal.

Answer: (b)

55. The z-transform of a signal $x[n]$ is given by $4z^{-3} + 3z^{-1} + 2 - 6z^2 + 2z^3$. It is applied to a system, with a transfer function $H(z) = 3z^{-1} - 2$. Let the output be $y[n]$. Which of the following is true?
- a) $y[n]$ is non causal with finite support.
 - b) $y[n]$ is causal with infinite support.
 - c) $y[n] = 0; |n| > 3$.
 - d) None of the above.

Answer: (a)

56. The period of the signal $x(t) = 10 \sin 12\pi t + 4 \cos 18\pi t$ is:
- a) $\frac{\pi}{4}$.
 - b) $\frac{1}{6}$.
 - c) $\frac{1}{2}$.
 - d) $\frac{1}{3}$.

Answer: (d)

57. The Fourier transform of impulse function is:

- a) $\delta(\omega)$.
- b) 1.
- c) $2\pi\omega$.
- d) None of the above.

Answer: (b)

58. Discrete-time system is stable if the poles are:

- a) Within unit circle.
- b) Outside unit circle.
- c) On the unit circle.
- d) None of the above.

Answer: (a)

59. The z-transform of $-u[-n - 1]$ is:

- a) $\frac{1}{1-z}$.
- b) $\frac{z}{1-z}$.
- c) $\frac{1}{1-z^{-1}}$.
- d) None of the above.

Answer: (c)

60. A system is said to be shift invariant only if:

- a) A shift in the input signal also results in the corresponding shift in the output.
- b) A shift in the input signal does not exhibit in the corresponding shift in the output.
- c) A shifting level does not vary in an input as well as output.
- d) None of the above.

Answer: (a)