1. For a unit step function the value of the function should be:
   a) 0 for t < 0 and 1 for t ≥ 0
   b) 0 for t < 0 and -1 for t ≥ 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)
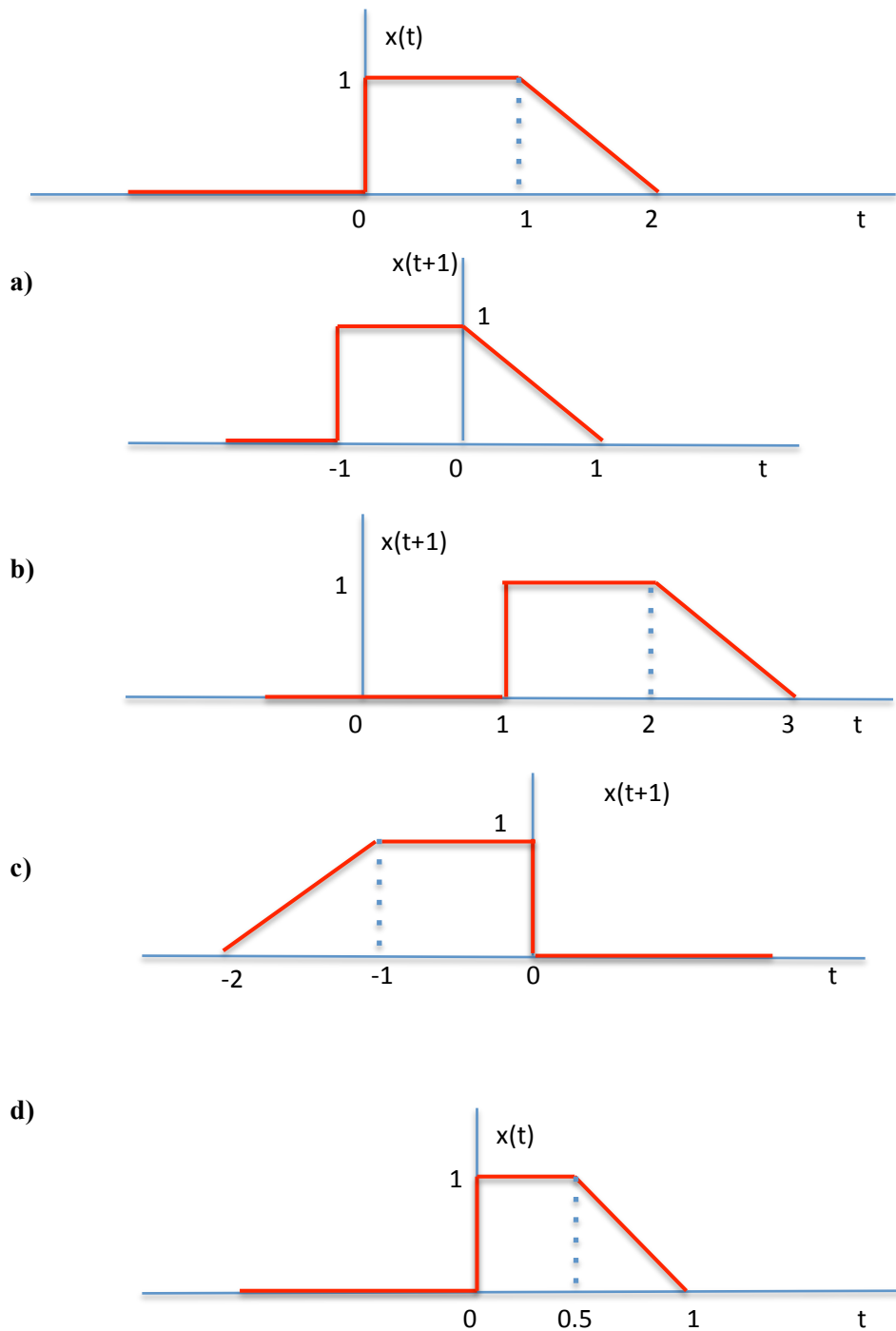
5. In a time shift operation, if $t_0 > 0$ then:
   a) The time shift is known as advance.
   b) The time shift is known as delay.
   c) The signal is decimated.
   d) None of the above.

   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:

x(t)

1

0   1   2   t

a)

x(t+1)

1

-1   0   1   t

b)

x(t+1)

1

0   1   2   3   t

c)

x(t+1)

1

-2   -1   0   t

d)

x(t)

1

0   0.5   1   t

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 α >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 δ [n] is defined as:
    a) $\delta[n] = \begin{cases} 0 & for \quad n = 0 \\ 1 & for \quad n \neq 0 \end{cases}$
    b) $\delta[n] = \begin{cases} 1 & for \quad n = 0 \\ 0 & for \quad n \neq 0 \end{cases}$
    c) $\delta[n] = \begin{cases} 1 & for \quad n > 0 \\ 0 & for \quad n < 0 \end{cases}$
    d) None of the above.

    Answer: (b)

15. The convolution of x (t) and h (t) is defined by:
   a) $y(t) = \int_{-\infty}^{\infty} x(\tau)h(t-\tau)dt$
   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) $\dfrac{dx(t)}{dt}$

   b) $jfX(e^{j\omega})$.

   c) $j\dfrac{dX(e^{j\omega})}{d\omega}$.

   d) None of the above.

   Answer: (c)

22. Which mathematical notation specifies the condition of periodicity for a continuous time signal?

   a) $x(t) = x(t + T_0)$

   b) $x(n) = x(n + N)$.

   c) $x(t) = e^{-at}$.

   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.

<div align="right"><u>**Answer: (d)**</u></div>

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.

<div align="right"><u>**Answer: (c)**</u></div>

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 ➔ Time shifting ➔ Reflection

   b) Time shifting ➔ Time scaling ➔ Reflection

   c) Reflection ➔ Time shifting ➔ Time scaling.

   d) None of the above.

<div align="right"><u>**Answer: (b)**</u></div>

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.

<div align="right"><u>**Answer: (a)**</u></div>

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.

<div align="right"><u>**Answer: (c)**</u></div>

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.

<div align="right"><u>**Answer: (b)**</u></div>

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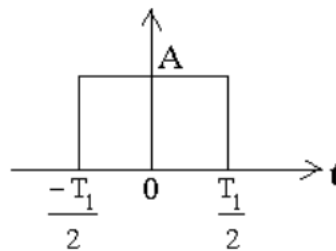   c) $H(e^{j\omega}) * H_1(e^{j\omega}) = \delta(\omega)$.
   d) None of the above.

Answer: (a)

41. The transfer function of a stable system is $H(z) = \dfrac{1}{1-0.5z^{-1}} + \dfrac{1}{1-2z^{-1}}$. 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) $\dfrac{A^2}{2}$.
   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.

<div align="right">**Answer: (a)**</div>

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.

<div align="right">**Answer: (c)**</div>

46. Damped sinusoids are:
   a) Sinusoidal signals multiplied by growing exponentials.
   b) Sinusoidal signals divided by growing exponentials.
   c) Sinusoidal signals multiplied by decaying exponentials.
   d) Sinusoidal signals divided by decaying exponentials

<div align="right">**Answer: (c)**</div>

47. The function which has its Fourier transform, Laplace transform and Z-transform unity is:
   a) Gaussian.
   b) Sinc.
   c) Pulse.
   d) Impulse.

<div align="right">**Answer: (d)**</div>

48. The z-transform of $\delta[n - m]$ is:
   a) z^{-m}.
   b) z^{m}.
   c) $\frac{1}{z}$.
   d) None of the above.

<div align="right">**Answer: (a)**</div>

49. The area under the curve $\int_{-\infty}^{\infty} \delta(t)dt$ is:
   a) ∞.
   b) Unity.
   c) 0.
   d) None of the above.

<div align="right">**Answer: (b)**</div>

50. For a stable system:

   a) $|z| > 1$.

   b) $|z| = 1$.

   c) $|z| < 1$.

   d) None of the above.

<div align="right">**Answer: (c)**</div>