**Properties of Z Transform**

1. What is the set of all values of z for which X(z) attains a finite value?  
a) Radius of convergence  
b) Radius of divergence  
c) Feasible solution  
d) None of the mentioned  
**Answer: Radius of convergence**

2. Is the discrete time LTI system with impulse response h(n)=an(n) (|a| < 1) BIBO stable?  
a) True  
b) False  
**Answer: True**

3. What is the ROC of a causal infinite length sequence?  
a) |z|<r1  
b) |z|>r1  
c) r2<|z|<r1  
d) None of the mentioned  
**Answer: |z|>r1**

4. The Z-Transform X(z) of a discrete time signal x(n) is defined as \_\_\_\_\_\_\_\_\_\_\_\_  
a)  ∑∞k=-∞ x(n)zn  
b)  ∑∞k=-∞ x(n)z-n  
c)  ∑∞k=0x(n)zn  
d) None of the mentioned  
**Answer:  ∑∞k=-∞ x(n)z-n**

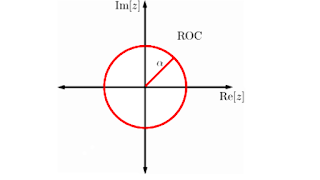
5. What is the z-transform of the following finite duration signal?  
x(n)={2, 4, 5, 7, 0, 1}?  
                   ↑  
a) 2 + 4z + 5z2 + 7z3 + z4  
b) 2 + 4z + 5z2 + 7z3 + z5  
c) 2 + 4z-1 + 5z-2 + 7z-3 + z-5  
d) 2z2 + 4z + 5 +7z-1 + z-3  
**Answer: 2z2 + 4z + 5 +7z-1 + z-3**

6. What is the ROC of the signal x(n)=δ(n-k), k>0?  
a) z=0  
b) z=∞  
c) Entire z-plane, except at z=0  
d) Entire z-plane, except at z=∞  
**Answer: Entire z-plane, except at z=0**

7. What is the z-transform of the signal x(n) = -αnu(-n-1)?  
a) 1/(1−αz^−1);ROC |z|<|α|  
b) −1/(1+αz^−1);ROC |z|<|α|  
c) −1/(1−αz^−1);ROC |z|>|α|  
d) −1/(1−αz^−1);ROC |z|<|α|  
**Answer: −1/(1−αz^−1);ROC |z|<|α|**

8. What is the z-transform of the signal x(n)=(0.5)nu(n)?  
a) 1/(1−0.5z^−1);ROC|z|>0.5  
b) 1/(1−0.5z^−1);ROC|z|<0.5  
c) 1/(1+0.5z^−1);ROC|z|>0.5  
d) 1/(1+0.5z^−1);ROC|z|<0.5  
**Answer: 1/(1−0.5z^−1);ROC|z|>0.5**

9. Which of the following series has an ROC as mentioned below?

[](https://1.bp.blogspot.com/-h7z8ucWnfvU/YNFX3GaqzMI/AAAAAAAABSY/OVKdT2kFRMkvQAnP2ajDFDMm8vWqqT6aQCLcBGAsYHQ/s1280/20210622_084926.png)

a) α-nu(n)  
b) αnu(n)  
c) α-nu(-n)  
d) αnu(n)  
**Answer: αnu(n)**

10. What is the ROC of the z-transform of the signal x(n)= anu(n)+bnu(-n-1)?  
a) |a|<|z|<|b|  
b) |a|>|z|>|b|  
c) |a|>|z|<|b|  
d) |a|<|z|>|b|  
**Answer: |a|<|z|<|b|**

11. What is the ROC of z-transform of an two sided infinite sequence?  
a) |z|>r1  
b) |z|<r1  
c) r2<|z|<r1  
d) None of the mentioned  
**Answer: r2<|z|<r1**

12. The z-transform of a sequence x(n) which is given as X(z)= ∑∞k=-∞ x(n)z-nis known as \_\_\_\_\_\_\_\_\_\_\_\_\_  
a) Uni-lateral Z-transform  
b) Bi-lateral Z-transform  
c) Tri-lateral Z-transform  
d) None of the mentioned  
**Answer: Bi-lateral Z-transform**

13. What is the ROC of the system function H(z) if the discrete time LTI system is BIBO stable?  
a) Entire z-plane, except at z=0  
b) Entire z-plane, except at z=∞  
c) Contain unit circle  
d) None of the mentioned  
**Answer: Contain unit circle**

14. The ROC of z-transform of any signal cannot contain poles.  
a) True  
b) False  
Answer: True

15. What is the ROC of z-transform of finite duration anti-causal sequence?  
a) z=0  
b) z=∞  
c) Entire z-plane, except at z=0  
d) Entire z-plane, except at z=∞  
**Answer: Entire z-plane, except at z=∞**

1. According to Time shifting property of z-transform, if X(z) is the z-transform of x(n) then what is the z-transform of x(n-k)?  
a) zkX(z)  
b) z-kX(z)  
c) X(z-k)  
d) X(z+k)  
**Answer: z-kX(z)**

2. Which of the following justifies the linearity property of z-transform?[x(n)↔X(z)].  
a) x(n)+y(n) ↔ X(z)Y(z)  
b) x(n)+y(n) ↔ X(z)+Y(z)  
c) x(n)y(n) ↔ X(z)+Y(z)  
d) x(n)y(n) ↔ X(z)Y(z)  
**Answer: x(n)+y(n) ↔ X(z)+Y(z)**

3. If X(z) is the z-transform of the signal x(n) then what is the z-transform of anx(n)?  
a) X(az)  
b) X(az-1)  
c) X(a-1z)  
d) None of the mentioned  
**Answer: X(a-1z)**

4. What is the z-transform of the signal x(n)=[3(2n)-4(3n)]u(n)?  
a) (3/1− 2z-1)−(4/1−3z-1)  
b) (3/1−2z-1)−(4/1+3z-1)  
c) (3/1−2z)−(4/1−3z)  
d) None of the mentioned  
**Answer: (3/1− 2z-1)−(4/1−3z-1)**

5. What is the z-transform of the signal x(n)=an(sinω0n)u(n)?  
a) [az-1sinω0]/[1+2az-1cosω0+a2z-2 ]  
b) [az-1sinω0]/[1−2az-1cosω0−a2z-2 ]  
c) [(az)-1cosω0]/[1−2az-1cosω0+a2z-2 ]  
d) [az-1sinω0]/[1−2az-1cosω0+a2z-2 ]  
**Answer: [az-1sinω0]/[1−2az-1cosω0+a2z-2 ]**

6. If the ROC of X(z) is r1<|z|<r2, then what is the ROC of X(a-1z)?  
a) |a|r1<|z|<|a|r2  
b) |a|r1>|z|>|a|r2  
c) |a|r1<|z|>|a|r2  
d) |a|r1>|z|<|a|r2  
**Answer: |a|r1<|z|<|a|r2**

7. If X(z) is the z-transform of the signal x(n), then what is the z-transform of the signal x(-n)?  
a) X(-z)  
b) X(z-1)  
c) X-1(z)  
d) None of the mentioned  
**Answer: X(z-1)**

8. What is the z-transform of the signal x(n)=nanu(n)?  
a) (az)-1/(1−(az)-1)2  
b) (az)-1/(1−(az)-1)2  
c) (az)-1/(1−az-1)2  
d) (az)-1/(1+az-1)2  
**Answer: (az)-1/(1−az-1)2**

9. X(z) is the z-transform of the signal x(n), then what is the z-transform of the signal nx(n)?  
a) −z{dX(z)/dz}  
b) z{dX(z)/dz}  
c) -z-1{dX(z)/dz}  
d) z-1{dX(z)/dz}  
**Answer: −z{dX(z)/dz}**

10. What is the z-transform of the signal x(n)=sin(jω0n)u(n)?  
a) (z-1sinω0)/1+2z-1cosω0+z-2  
b) (z-1sinω0)/1−2z-1cosω0−z-2  
c) (z-1cosω0)/1−2z-1cosω0+z-2  
d) (z-1sinω0)/1−2z-1cosω0+z-2  
**Answer: (z-1sinω0)/1−2z-1cosω0+z-2**

11. What is the z-transform of the signal defined as x(n)=u(n)-u(n-N)?  
a) 1+zN/1+z-1  
b) 1−zN/1+z-1  
c) 1+z-N/1+z-1  
d) 1−z-N/1−z-1  
**Answer: 1−z-N/1−z-1**

12. If Z{x(n)}=X(z) and the poles of X(z) are all inside the unit circle, then the final value of x(n) as n→∞ is given by i.e., lim n→∞x(n)=?  
a) lim z→1[(z−1)X(z)]  
b) lim z→0[(z−1)X(z)]  
c) lim z→−1[(z−1)X(z)]  
d) lim z→1[(z+1)X(z)]  
**Answer: lim z→1[(z−1)X(z)]**

13. What is the convolution x(n) of the signals x1(n)={1,-2,1} and x2(n)={1,1,1,1,1,1}?

a) {1,1,0,0,0,0,1,1}  
b) {-1,-1,0,0,0,0,-1,-1}  
c) {-1,1,0,0,0,0,1,-1}  
d) {1,-1,0,0,0,0,-1,1}  
**Answer: {1,-1,0,0,0,0,-1,1}**

14. If x1(n)={1,2,3} and x2(n)={1,1,1}, then what is the convolution sequence of the given two signals?  
a) {1,2,3,1,1}  
b) {1,2,3,4,5}  
c) {1,3,5,6,2}  
d) {1,2,6,5,3}  
**Answer: {1,2,6,5,3}**

15. If Z{x1(n)}=X1(z) and Z{x2(n)}=X2(z) then Z{x1(n)\*x2(n)}=?  
a) X1(z).X2(z)  
b) X1(z)+X2(z)  
c) X1(z)\*X2(z)  
d) None of the mentioned  
**Answer: X1(z).X2(z)**

16. What is the z-transform of the signal defined as x(n)=u(n)-u(n+N)?  
a) 1+zN/1+z-1  
b) 1−zN/1−z-1  
c) 1+z-N/1+z-1  
d) 1−z-N/1−z-1  
**Answer: 1−z-N/1−z-1**

17. If x(n) is an imaginary sequence, then the z-transform of the real part of the sequence is?  
a) (1/2)[X(z)+X\**(z*\*)]  
b) (1/2)[X(z)-X\**(z*\*)]  
c) (1/2)[X(-z)-X\**(z*\*)]  
d) (1/2)[X(-z)+X\**(z*\*)]  
**Answer: (1/2)[X(z)+X\**(z*\*)]**

18. What is the z-transform of the signal x(n)=[5(3n)-9(7n)]u(n)?  
a)[ 5/(1−3z-1)]−[9/(1−7z-1)]  
b) [5/1+3z-1]−[9/(1+7z-1)]  
c) [5/1−3z]−[9/1−7z]  
d) None of the mentioned  
**Answer: [ 5/(1−3z-1)]−[9/(1−7z-1)]**

19. If Z{x1(n)}=X1(z) and Z{x2(n)}=X2(z) then what is the z-transform of correlation between the two signals?  
a) X1(z).X2(z-1)  
b) X1(z).X2(z-1)  
c) X1(z).X2(z)  
d) X1(z).X2(-z)  
**Answer: X1(z).X2(z-1)**

20. What is the z-transform of the signal x(n)=δ(n-n0)?  
a) zn0  
b) z-n0  
c) zn-n0  
d) zn+n0  
**Answer: z-n0**

21. If X(z) is the z-transform of the signal x(n), then what is the z-transform of x\*(n)?  
a) X(z\*)  
b) X\*(z)  
c) X\*(-z)  
d) X\**(z*\*)  
**Answer: X\**(z*\*)**

22. What is the z-transform of the signal x(n)= x1(n).x2\*(n)?  
a) 1/2πj ∮X1(v)X2(zv)v-1dv  
b) 1/2πj ∮X1(v)X\**2(z*\*/v\*)v-1dv  
c) 1/2πj ∮X1(v)X\*2(z/v)v-1dv  
d) None of the mentioned  
**Answer: 1/2πj ∮X1(v)X\**2(z*\*/v\*)v-1dv**

23. What is the signal whose z-transform is given as X(z)=1/2πj ∮X1(v)X2(zv)v-1dv?  
a) x1(n)\*x2(n)  
b) x1(n)\*x2(-n)  
c) x1(n).x2(n)  
d) x1(n)\**x2*\*(n)  
**Answer: x1(n).x2(n)**

24. What is the signal x(n) whose z-transform X(z)=log(1+az-1);|z|>|a|?  
a) (−1)n.an/n.u(n−1)  
b) (−1)n.an/n.u(n+1)  
c) (−1)n-1.an/n.u(n−1)  
d) (−1)n-1.an/n.u(n+1)  
**Answer: (−1)n-1.an/n.u(n−1)**

25. If x(n) is causal, then lim z→∞ X(z)=?  
a) x(-1)  
b) x(1)  
c) x(0)  
d) Cannot be determined  
**Answer: x(0)**

26. What is the z-transform of the signal x(n)=cos(jω0n)u(n)?  
a) [z-1sinω0]/[1+2z-1cosω0+z-2 ]  
b) [z-1sinω0]/[1−2z-1cosω0−z-2 ]  
c) [z-1cosω0]/[1−2z-1cosω0+z-2 ]  
d) [z-1sinω0]/[1−2z-1cosω0+z-2 ]  
**Answer: [z-1cosω0]/[1−2z-1cosω0+z-2 ]**

1. If one or more poles are located near the unit circle, then the rate of decay of signal is \_\_\_\_\_\_\_\_\_  
a) Slow  
b) Constant  
c) Rapid  
d) None of the mentioned  
**Answer: Slow**

2. If pk, k=1,2,…N are the poles of the system and |pk| < 1 for all k, then the natural response of such a system is called as Transient response.  
a) True  
b) False  
**Answer: True**

4. If all the poles have small magnitudes, then the rate of decay of signal is \_\_\_\_\_\_\_\_\_\_  
a) Slow  
b) Constant  
c) Rapid  
d) None of the mentioned  
**Answer: Rapid**

5. What is the transient response of the system described by the difference equation y(n)=0.5y(n-1)+x(n) when the input signal is x(n)= 10cos(πn/4)u(n) and the system is initially at rest?  
a) (0.5)nu(n)  
b) 0.5(6.3)nu(n)  
c) 6.3(0.5)n  
d) 6.3(0.5)nu(n)  
**Answer: 6.3(0.5)nu(n)**

6. What is the steady-state response of the system described by the difference equation y(n)=0.5y(n-1)+x(n) when the input signal is x(n)= 10cos(πn/4)u(n) and the system is initially at rest?  
a) 13.56cos(πn/4 -28.7o)  
b) 13.56cos(πn/4 +28.7o)u(n)  
c) 13.56cos(πn/4 -28.7o)u(n)  
d) None of the mentioned  
**Answer: 13.56cos(πn/4 -28.7o)u(n)**

7. If all the poles of H(z) are inside the unit circle, then the system is said to be \_\_\_\_\_\_\_\_  
a) Only causal  
b) Only BIBO stable  
c) BIBO stable and causal  
d) None of the mentioned  
**Answer: BIBO stable and causal**

8. A linear time invariant system is characterized by the system function H(z)=(1/1−0.5z-1)+(2/1−3z-1). What is the h(n) if the system is stable?  
a) (0.5)nu(n)-2(3)nu(n)  
b) (0.5)nu(-n-1)-2(3)nu(-n-1)  
c) (0.5)nu(-n-1)-2(3)nu(n)  
d) (0.5)nu(n)-2(3)nu(-n-1)  
**Answer: (0.5)nu(n)-2(3)nu(-n-1)**

9. A linear time invariant system is characterized by the system function H(z)=(1/1−0.5z-1)+(2/1−3z-1). What is the h(n) if the system is anti causal?  
a) (0.5)nu(n)+2(3)nu(n)  
b) (0.5)nu(-n-1)-2(3)nu(-n-1)  
c) -[(0.5)n+2(3)n]u(-n-1)  
d) (0.5)nu(n)-2(3)nu(-n-1)  
**Answer: -[(0.5)n+2(3)n]u(-n-1)**

10. A linear time invariant system is characterized by the system function H(z)=(1/1−0.5z-1)+(2/1−3z-1). What is the ROC of H(z) if the system is causal?  
a) |z|<3  
b) |z|>3  
c) |z|<0.5  
d) |z|>0.5  
**Answer: |z|>3**

11. What is the unit step response of the system described by the difference equation?  
y(n)=0.9y(n-1)-0.81y(n-2)+x(n) under the initial conditions y(-1)=y(-2)=0?  
a) [1.099+1.088(0.9)n.cos(π/3n+5.2o)]u(n)  
b) [1.099+1.088(0.9)n.cos(π/3n−5.2o)]u(n)  
c) [1.099+1.088(0.9)n.cos(π/3n−5.2o)]  
d) None of the mentioned  
**Answer: [1.099+1.088(0.9)n.cos(π/3n−5.2o)]u(n)**

12. If the ROC of the system function is the exterior of a circle of radius r < ∞, including the point z = ∞, then the system is said to be \_\_\_\_\_\_\_\_\_\_\_  
a) Stable  
b) Causal  
c) Anti causal  
d) None of the mentioned  
**Answer: Causal**

13. A linear time invariant system is said to be BIBO stable if and only if the ROC of the system function \_\_\_\_\_\_\_\_\_\_\_\_\_  
a) Includes unit circle  
b) Excludes unit circle  
c) Is an unit circle  
d) None of the mentioned  
**Answer: Includes unit circle**

5. What is the transient response of the system described by the difference equation y(n)=0.5y(n-1)+x(n) when the input signal is x(n)= 10cos(πn/4)u(n) and the system is initially at rest?  
a) (0.5)nu(n)  
b) 0.5(6.3)nu(n)  
c) 6.3(0.5)n  
d) 6.3(0.5)nu(n)  
**Answer: 6.3(0.5)nu(n)**

6. What is the steady-state response of the system described by the difference equation y(n)=0.5y(n-1)+x(n) when the input signal is x(n)= 10cos(πn/4)u(n) and the system is initially at rest?  
a) 13.56cos(πn/4 -28.7o)  
b) 13.56cos(πn/4 +28.7o)u(n)  
c) 13.56cos(πn/4 -28.7o)u(n)  
d) None of the mentioned  
**Answer: 13.56cos(πn/4 -28.7o)u(n)**

7. If all the poles of H(z) are inside the unit circle, then the system is said to be \_\_\_\_\_\_\_\_  
a) Only causal  
b) Only BIBO stable  
c) BIBO stable and causal  
d) None of the mentioned  
**Answer: BIBO stable and causal**

8. A linear time invariant system is characterized by the system function H(z)=(1/1−0.5z-1)+(2/1−3z-1). What is the h(n) if the system is stable?  
a) (0.5)nu(n)-2(3)nu(n)  
b) (0.5)nu(-n-1)-2(3)nu(-n-1)  
c) (0.5)nu(-n-1)-2(3)nu(n)  
d) (0.5)nu(n)-2(3)nu(-n-1)  
**Answer: (0.5)nu(n)-2(3)nu(-n-1)**

9. A linear time invariant system is characterized by the system function H(z)=(1/1−0.5z-1)+(2/1−3z-1). What is the h(n) if the system is anti causal?  
a) (0.5)nu(n)+2(3)nu(n)  
b) (0.5)nu(-n-1)-2(3)nu(-n-1)  
c) -[(0.5)n+2(3)n]u(-n-1)  
d) (0.5)nu(n)-2(3)nu(-n-1)  
**Answer: -[(0.5)n+2(3)n]u(-n-1)**

10. A linear time invariant system is characterized by the system function H(z)=(1/1−0.5z-1)+(2/1−3z-1). What is the ROC of H(z) if the system is causal?  
a) |z|<3  
b) |z|>3  
c) |z|<0.5  
d) |z|>0.5  
**Answer: |z|>3**

11. What is the unit step response of the system described by the difference equation?  
y(n)=0.9y(n-1)-0.81y(n-2)+x(n) under the initial conditions y(-1)=y(-2)=0?  
a) [1.099+1.088(0.9)n.cos(π/3n+5.2o)]u(n)  
b) [1.099+1.088(0.9)n.cos(π/3n−5.2o)]u(n)  
c) [1.099+1.088(0.9)n.cos(π/3n−5.2o)]  
d) None of the mentioned  
**Answer: [1.099+1.088(0.9)n.cos(π/3n−5.2o)]u(n)**

12. If the ROC of the system function is the exterior of a circle of radius r < ∞, including the point z = ∞, then the system is said to be \_\_\_\_\_\_\_\_\_\_\_  
a) Stable  
b) Causal  
c) Anti causal  
d) None of the mentioned  
**Answer: Causal**

13. A linear time invariant system is said to be BIBO stable if and only if the ROC of the system function \_\_\_\_\_\_\_\_\_\_\_\_\_  
a) Includes unit circle  
b) Excludes unit circle  
c) Is an unit circle  
d) None of the mentioned  
**Answer: Includes unit circle**

**1. A Laplace Transform exists when \_\_\_\_\_\_**  
  
A. The function is piece-wise continuous  
B. The function is of exponential order  
C. The function is piecewise discrete  
D. The function is of differential order  
  
a. A & B

**2. Where is the ROC defined or specified for the signals containing causal as well as anti-causal terms?**  
  
a. Greater than the largest pole  
b. Less than the smallest pole  
c. Between two poles  
d. Cannot be defined

Ans --- C

**4. According to the time-shifting property of Laplace Transform, shifting the signal in time domain corresponds to the \_\_\_\_\_\_**  
  
a. Multiplication by e-st0 in the time domain  
  
b. Multiplication by e-st0 in the frequency domain  
  
c. Multiplication by est0 in the time domain  
  
d. Multiplication by est0 in the frequency domain

Ans---- B

**6. Unilateral Laplace Transform is applicable for the determination of linear constant coefficient differential equations with \_\_\_\_\_\_\_\_**  
  
a. Zero initial condition  
b. Non-zero initial condition  
c. Zero final condition  
d. Non-zero final condition

**ANSWER: b. Non-zero initial condition**

**7. What should be location of poles corresponding to ROC for bilateral Inverse Laplace Transform especially for determining the nature of time domain signal?**  
  
a. On L.H.S of ROC  
b. On R.H.S of ROC  
c. On both sides of ROC  
d. None of the above  
**ANSWER: c. On both sides of ROC**

**8. Generally, the convolution process associated with the Laplace Transform in time domain results into\_\_\_\_\_\_\_\_**  
a. Simple multiplication in complex frequency domain  
b. Simple division in complex frequency domain  
c. Simple multiplication in complex time domain  
d. Simple division in complex time domain  
**ANSWER: a. Simple multiplication in complex frequency domain**

**9. An impulse response of the system at initially rest condition is basically a response to its input & hence also regarded as,**  
  
a. Black's function  
b. Red's function  
c. Green's function  
d. None of the above  
**ANSWER: c. Green's function**

**10. When is the system said to be causal as well as stable in accordance to pole/zero of ROC specified by system transfer function?**  
  
a. Only if all the poles of system transfer function lie in left-half of S-plane  
  
b. Only if all the poles of system transfer function lie in right-half of S-plane  
  
c. Only if all the poles of system transfer function lie at the centre of S-plane  
  
d. None of the above  
**ANSWER: a. Only if all the poles of system transfer function lie in left-half of S-plane**