

1. Which of the following best describes the z-transform?
 - a) A technique used in image processing
 - b) A method for analyzing discrete-time systems in the frequency domain
 - c) A method for converting analog signals to digital signals
 - d) A technique used for solving differential equations

Answer: b) A method for analyzing discrete-time systems in the frequency domain

Explanation: The z-transform is a mathematical tool used for analyzing discrete-time systems in the frequency domain, similar to how the Laplace transform is used for continuous-time systems.

2. What is the Region of Convergence (ROC) of a finite duration sequence in z-transform?
 - a) Inside the unit circle
 - b) Outside the unit circle
 - c) On the unit circle
 - d) Cannot be determined

Answer: c) On the unit circle

Explanation: For a finite duration sequence, the ROC of its z-transform lies on the unit circle in the z-plane.

3. In the z-transform, what does the Region of Convergence (ROC) of an infinite duration sequence indicate?
 - a) Stability of the sequence
 - b) Convergence of the sequence
 - c) Causality of the sequence

d) Frequency response of the sequence

Answer: b) Convergence of the sequence

Explanation: The ROC of an infinite duration sequence indicates the range of values for which the z-transform converges, indicating the convergence behavior of the sequence.

4. What is the relationship between Discrete-Time Fourier Transform (DTFT) and z-transform?

- a) They are the same
- b) DTFT is a special case of z-transform
- c) z-transform is a special case of DTFT
- d) They are unrelated

Answer: c) z-transform is a special case of DTFT

Explanation: The z-transform is essentially a sampled version of the Laplace transform, which makes it a special case of the DTFT.

5. Which of the following is a property of the Region of Convergence (ROC) in the context of z-transform?

- a) It can be any closed contour in the z-plane
- b) It cannot include the unit circle
- c) It remains constant for all z-transforms
- d) It determines the range of convergence for the z-transform

Answer: d) It determines the range of convergence for the z-transform

Explanation: The ROC determines where the z-transform converges, indicating the range of

values for which the transform is valid.

6. What is a property of the z-transform regarding linearity?

- a) Linearity implies the ROC is always outside the unit circle
- b) Linearity implies the z-transform is always stable
- c) Linearity implies the z-transform of a sum is the sum of the z-transforms
- d) Linearity implies the z-transform cannot handle infinite sequences

Answer: c) Linearity implies the z-transform of a sum is the sum of the z-transforms

Explanation: The z-transform is linear, meaning that the transform of a sum of sequences is equal to the sum of their individual transforms.

7. How is the Inverse z-Transform related to the z-Transform?

- a) It is the same as the z-Transform
- b) It is the reciprocal of the z-Transform
- c) It is used to convert z-Domain signals back to the time domain
- d) It is used for frequency analysis of discrete-time systems

Answer: c) It is used to convert z-Domain signals back to the time domain

Explanation: The inverse z-transform is used to convert signals from the z-domain (frequency domain) back to the time domain.

8. What does the z-transform provide for the analysis of discrete-time LTI systems?

- a) Frequency response
- b) Impulse response
- c) Step response

d) Transfer function

Answer: d) Transfer function

Explanation: The z-transform provides the transfer function of discrete-time LTI systems, allowing for their analysis in the frequency domain.

9. What does the Unilateral z-Transform focus on?

- a) Signals in the past
- b) Signals in the future
- c) Signals in both past and future
- d) Only present signals

Answer: b) Signals in the future

Explanation: The Unilateral z-Transform is concerned with signals that start at $n=0$ and extend into the future, ignoring past values.

10. Which property distinguishes the Unilateral z-Transform from the Bilateral z-Transform?

- a) The range of n values
- b) The range of z values
- c) The presence of complex conjugate poles
- d) The stability of the transform

Answer: a) The range of n values

Explanation: The Unilateral z-Transform considers signals starting at $n=0$, while the Bilateral z-Transform considers signals from $-\infty$ to $+\infty$, leading to different ranges of n values.

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