Started on	Friday, 17 November 2023, 6:32 PM
State	Finished
Completed on	Friday, 17 November 2023, 7:15 PM
Time taken	42 mins 34 secs
Grade	**12.00** out of 15.00 (**80**%)

Question 1

Correct

Mark 1.00 out of 1.00

Two causal discrete-time signals $x[n]$ and $y[n]$ are related as $y[n] = \sum_{m=0}^{n} x[m]$. If the z-transform of $y[n]$ is $\frac{2}{z(z-1)^2}$, the value of $x[2]$ is ......

Select one:

- 3
- -2
- 0 ✓
- 2
- -1
- 1
- None of these

Your answer is correct.

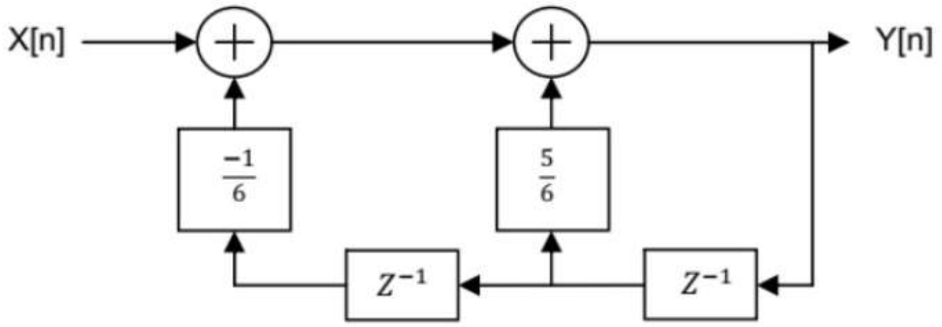
The correct answer is: 0

Question **2**

Correct

Mark 1.00 out of 1.00

For the discrete-time system shown in figure, the poles of the system transfer function are located at



Select one:

- 2,1/3
- 1/2,1/3 ✓
- None of these
- 1/2,-1/3
- 2,3
- -1/2,1/3
- 1/2,3

Your answer is correct.

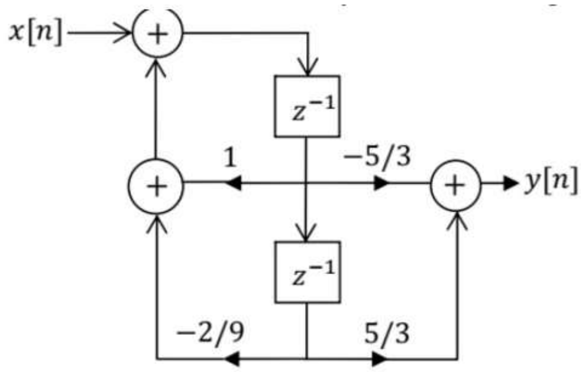
The correct answer is: 1/2,1/3

Question 3

Correct

Mark 1.00 out of 1.00

A realization of a stable discrete time system is shown in the figure. If the system is excited by a unit step sequence input $x[n] = u[n]$, the response $y[n]$ is



Select one:

- $5(-\frac{2}{3})^n u[n] - 3(-\frac{1}{3})^n u[n]$
- $4(\frac{1}{3})^n u[n] - 5(\frac{2}{3})^n u[n]$
- $4(-\frac{1}{3})^n u[n] - 5(-\frac{2}{3})^n u[n]$
- $5(\frac{1}{3})^n u[n] - 5(\frac{2}{3})^n u[n]$ ✓
- $5(\frac{2}{3})^n u[n] - 5(\frac{1}{3})^n u[n]$
- $5(\frac{2}{3})^n u[n] - 3(\frac{1}{3})^n u[n]$
- None of these

Your answer is correct.

The correct answer is: $5(\frac{1}{3})^n u[n] - 5(\frac{2}{3})^n u[n]$

Question 4

Not answered

Marked out of 1.00

Consider a causal and stable LTI system with rational transfer function $H(z)$. Whose corresponding impulse response begins at $n = 0$. Further, $H(1) = \frac{5}{4}$. The poles of $H(z)$ are $P_k = \frac{1}{\sqrt{2}}\exp(\frac{j(2k-1)\pi}{4})$ for $k = 1, 2, 3, 4$. The zeros of $H(z)$ are all z=0. Let $g[n] = j^n h[n]$. The value of $g[8]$ is approximately

Select one:

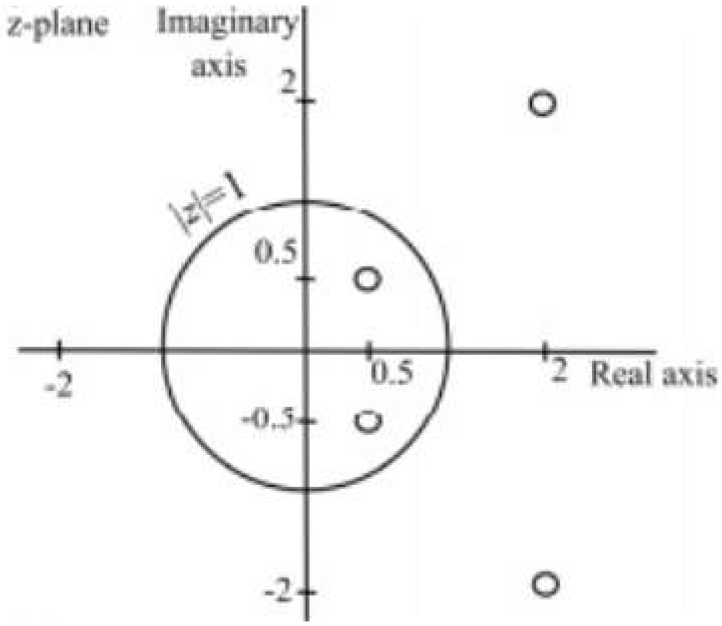
- 0.03
- 0.09
- 0.01
- 0.20
- 0.06
- None of these
- 0.30

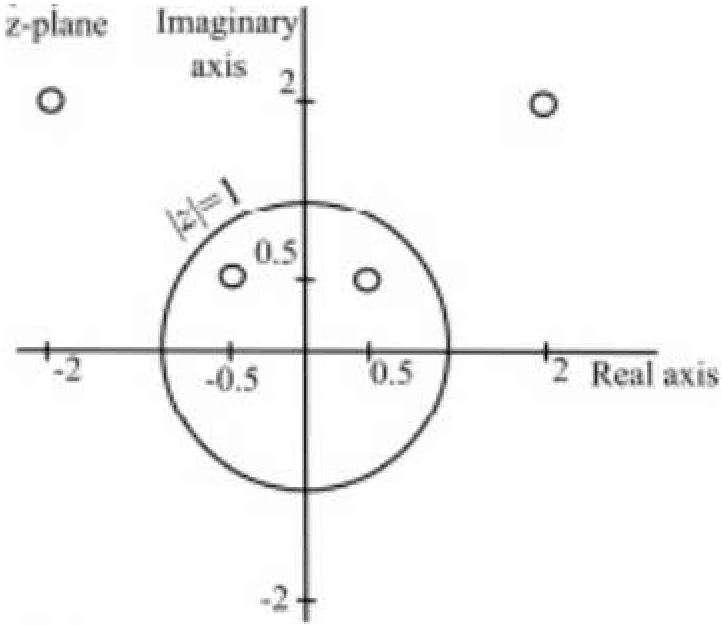
Your answer is incorrect.

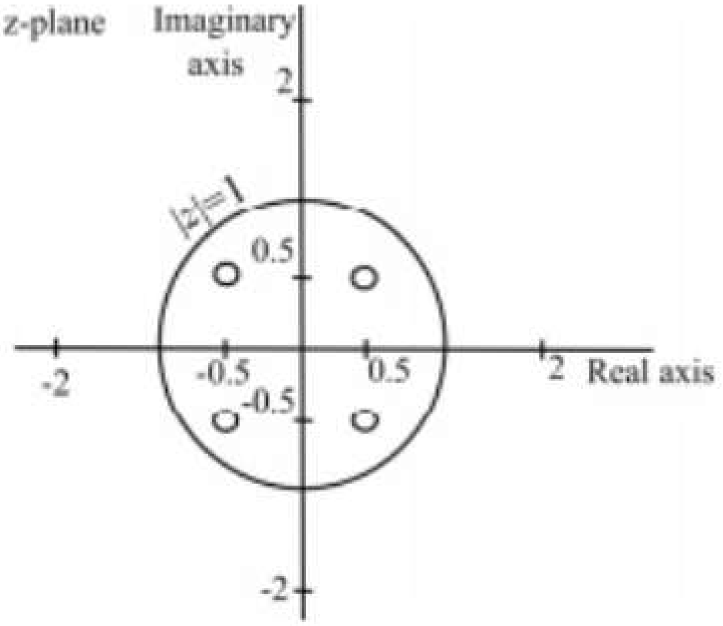
The correct answer is: 0.09

Let $H(z)$ be the z-transform of a real-valued discrete-time signal h[n]. if $P(z) = H(z)H^*(\frac{1}{z^*})$ has a zero at $z = \frac{1}{2} + \frac{1}{2}j$, and $P(z)$ has a total of four zeros (in the finite Z-plane excluding the origin), which one of the following plots represent all the zeros correctly?

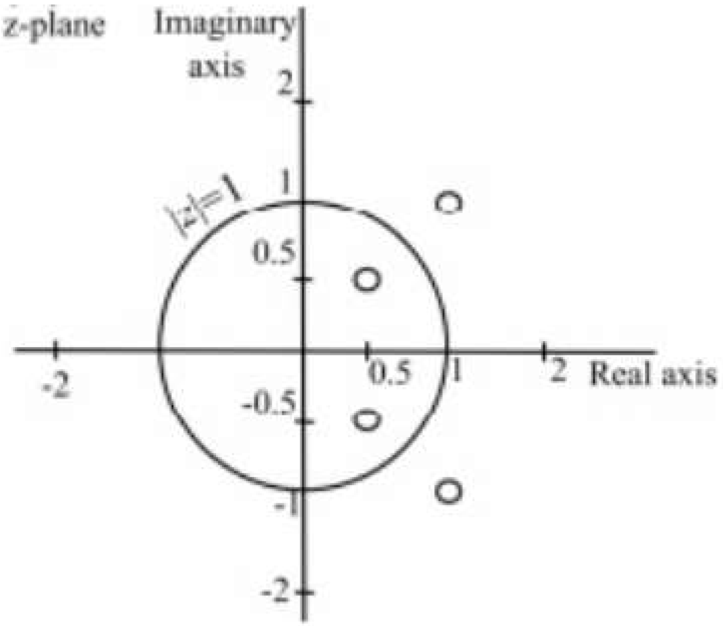
Select one:



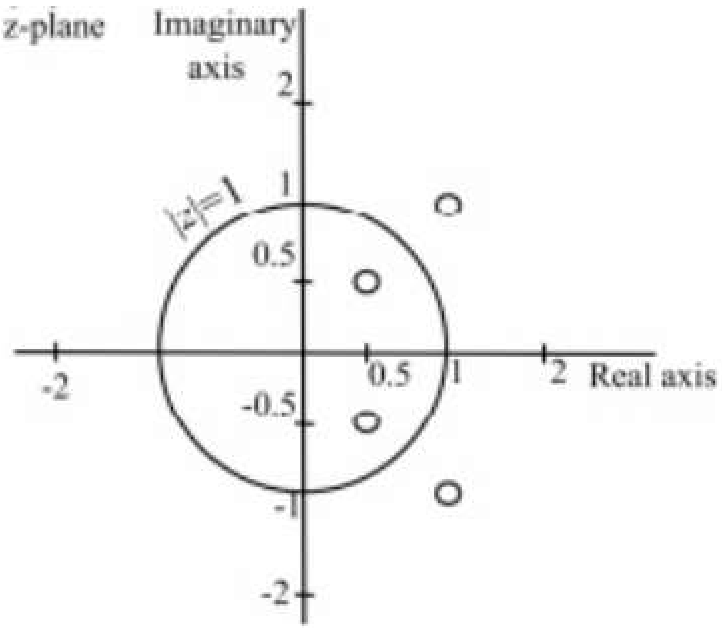




None of the options are correct



Your answer is incorrect.



The correct answer is:

Question 6

Incorrect

Mark 0.00 out of 1.00

The discrete-time signal $x[n] \leftrightarrow X(z) = \sum_{n=0}^{\infty} \frac{3^n}{(2+n)} z^{2n}$, where $\leftrightarrow$ denotes a transform-pair relationship, is orthogonal to the signal

Select one:

- (selected) $y_4[n] \leftrightarrow Y_4(z) = 2z^{-4} + 3z^{-2} + 1$ ✗
- None of the options is correct
- $y_2[n] \leftrightarrow Y_2(z) = \sum_{n=0}^{\infty}(5^n - n)z^{-(2n+1)}$
- $y_3[n] \leftrightarrow Y_3(z) = \sum_{n=0}^{\infty} 2^{-|n|} z^{-n}$
- $y_1[n] \leftrightarrow Y_1(z) = \sum_{n=0}^{\infty}(\frac{2}{3})^n z^{-n}$

Your answer is incorrect.

The correct answer is: $y_2[n] \leftrightarrow Y_2(z) = \sum_{n=0}^{\infty}(5^n - n)z^{-(2n+1)}$

Question 7

Correct

Mark 1.00 out of 1.00

It is known that $H(z)$ is of rational type. consider the following statement:

Statement 1: Given the poles and zeros of $P(z) = H(z)H^*(1/z^*)$, you can uniquely determine the zeros and poles of $H(z)$

Statement 2: Given $P(e^{j\omega})$, you can determine $H(z)$

Select one:

- Both statements are always true
- statement 2 is true, but statement 1 is false
- (selected) Statements 1 and 2 can be true under some conditions on $H(z)$ ✓
- Statement 1 and 2 are both always false
- statement 1 is true, but statement 2 is false

Your answer is correct.

The correct answers are: Statement 1 and 2 are both always false, statement 1 is true, but statement 2 is false, Statements 1 and 2 can be true under some conditions on $H(z)$

Question 8

Correct

Mark 1.00 out of 1.00

Let $H_1(z) = (1 - pz^{-1})^{-1}$, $H_2(z) = (1 - qz^{-1})^{-1}$, $H(z) = H_1(z) + rH_2(z)$. The quantities p, q, r are real numbers. Consider $p = \frac{1}{2}, q = -\frac{1}{4}, |r| < 1$. if the zero of $H(z)$ lies on unit circle, then $r =$.......

Answer: -0.5

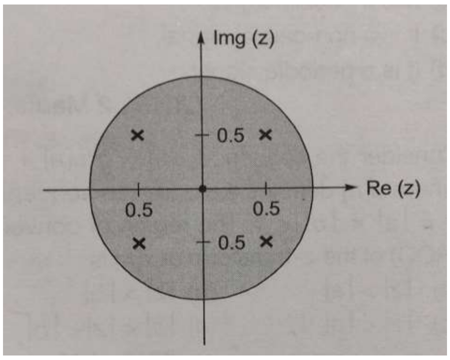
The correct answer is: -0.5

Question 9

Correct

Mark 1.00 out of 1.00

The pole-zero diagram of a causal and stable discrete-time system is shown in the figure. The zero at the origin has multiplicity of 4. The impulse response of the system is $h[n]$. if $h[0] = 1$, we can conclude



Select one:

- one of the other options are correct
- $h[n]$ is real for only even n
- $h[n]$ is real for all n
- $h[n]$ is purely imaginary for all n
- $h[n]$ is purely imaginary for only odd

Your answer is correct.

The correct answer is: $h[n]$ is real for all n

Question **10**

Correct

Mark 2.00 out of 2.00

An input signal $x(t) = 2 + 5\sin(100\pi t)$ is sampled with a sampling frequency of 400HZ and the discrete-time sequence $x[n]$ applied to the system whose transfer function is represented by $\frac{Y(z)}{X(z)} = \frac{1}{N}\frac{(1-z^{-N})}{(1-z^{-1})}$ where, N represents the number of samples per time-period of $x[n]$. The output $y(n)$ of the system under steady state is

Select one:

- 2 ✓
- 3
- 5
- None of these
- 0
- 4
- 1

Your answer is correct.

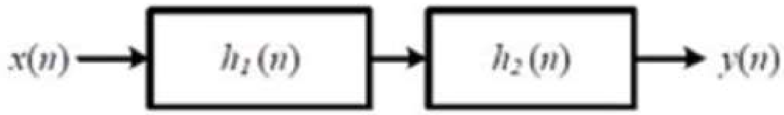
The correct answer is: 2

Question 11

Correct

Mark 1.00 out of 1.00

A cascade system having the impulse responses $h_1(n) = \{\uparrow 1, -1\}$ and $h_2(n) = \{\uparrow 1, 1\}$ is shown in the figure below, where symbol $\uparrow$ denotes the time origin (this implies that $h_1(0) = 1$ and h_1(1)=-1\). The input sequence x(n) for which the cascade system produces an output sequence $y(n) = \{\uparrow 1, 2, 1, -1, -2, -1\}$ is



Select one:

- None of the options are correct
- $x(n) = \{\uparrow 1, 2, 1, 1\}$
- $x(n) = \{\uparrow 1, 1, 2, 2\}$
- $x(n) = \{\uparrow 1, -2, 2, 1\}$
- $x(n) = \{\uparrow 1, 2, 2, 1\}$ ✔
- $x(n) = \{\uparrow -1, 2, 2, 1\}$
- $x(n) = \{\uparrow 1, 1, 1, 1\}$

Your answer is correct.

The correct answer is: $x(n) = \{\uparrow 1, 2, 2, 1\}$

Question 12

Correct

Mark 2.00 out of 2.00

Let $S = \sum_{n=0}^{\infty} n\alpha^n$, where $|\alpha| < 1$. The value of α in the range $0 < \alpha < 1$, such that $S = 2\alpha$ is approximately ......

Select one:

- 0.9
- 0.1
- 0.3 ✓
- 0
- None of these
- 1.4
- 0.6
- 1.1

Your answer is correct.

The correct answer is: 0.3

Question 13

Correct

Mark 1.00 out of 1.00

A discrete-time signal $x[n] = \delta(n-3) + 2\delta(n-5)$ has a transform $X(z)$. If $Y(z) = X(-z)$ is the z-transform of another signal y[n], then

Select one:

- $y[n] = x[n]$
- $y[n] = -x[-n]$
- $y[n] = -x[n]$ ✓
- $y[n] = x[-n]$
- None of these

Your answer is correct.

The correct answer is: $y[n] = -x[n]$