Started on	Saturday, 24 September 2022, 4:18 PM
State	Finished
Completed on	Saturday, 24 September 2022, 4:19 PM
Time taken	11 secs
Marks	0.00/24.00
Grade	**0.00** out of 10.00 (**0**%)

Question **1**

Not answered

Marked out of 1.00

Give a recursive definition with initial condition(s) of
f(n) = $(-3)^n$, n = 0, 1, 2, ...

- a. None of these
- b. f(0) = 1, and f(n) = -f(n+1)/3 for n > 0
- c. f(0) = 1, and f(n) = -3f(n-1) for n > 0
- d. f(0) = 1, and f(n) = $-3^{f(n-1)}$ for n > 0
- e. f(n) = -3f(n-1)

Your answer is incorrect.

The correct answer is: f(0) = 1, and f(n) = -3f(n-1) for n > 0

Question 2

Not answered

Marked out of 1.00

Give a recursive definition of the set of strings S = {1,111,11111,1111111, ...}

(i) $1 \in S; x \in S \to x11 \in S$

(ii) $1 \in S; x \in S \to x1 \in S$

- a. Only (ii)
- b. Neither
- c. Only (i)
- d. Both

Your answer is incorrect.

The correct answer is:
Only (i)

Question 3

Not answered

Marked out of 1.00

Given the function

$$A(m,n) = \begin{cases} 2n & \text{if } m = 0 \\ 0 & \text{if } m \geq 1 \text{ and } n = 0 \\ 2 & \text{if } m \geq 1 \text{ and } n = 1 \\ A(m-1, A(m, n-1)) & \text{if } m \geq 1 \text{ and } n \geq 2 \end{cases}$$

Find A(2, 2)

- a. 8
- b. 2
- c. 1
- d. None of these
- e. 4

Your answer is incorrect.

The correct answer is:
4

Question **4**

Not answered

Marked out of 1.00

Consider the following procedure

procedure *T*(n: non-negative integer)

if *n* < 3 **then** *return n*

else return {n + *T(n-1) - T(n-2)*}

Find T(3), T(4), T(5)

- a. 4, 7, 6
- b. 5, 6, 7
- c. None of these
- d. 4, 5, 6
- e. 4, 6, 7

Your answer is incorrect.

The correct answer is:
4, 6, 7

Question **5**

Not answered

Marked out of 1.00

Give a recursive definition with initial condition(s) of the set A = {1, 3, 9, 27, 81, ...}.

Which one is true?

(i) $1 \in A; x \in A \rightarrow 3x \in A.$
(ii) $1 \in A; x \in A \rightarrow 3^x \in A.$

- a. Neither
- b. Only (i)
- c. Both
- d. Only (ii)

Your answer is incorrect.

The correct answer is: Only (i)

Question **6**

Not answered

Marked out of 1.00

Give a recursive definition with initial condition(s) of the set A = {4, 8, 12, 16, 20, ...}.

Which one is true?

(i) $4 \in A; x \in A \rightarrow 4x \in A.$

(ii) $4 \in A; x \in A \rightarrow x + 4 \in A.$

- a. Only (i)
- b. Only (ii)
- c. Neither
- d. Both

Your answer is incorrect.

The correct answer is: Only (ii)

Question **7**

Not answered

Marked out of 1.00

Consider the following procedure

procedure *tinh*(*n*: non-negative integer)

if *n* = 0 **then** *return 0*

else return {*n* + *tinh*(*n* - 1)}

Given n= 10, what will be the output of the algorithm?

- a. 55
- b. 45
- c. None of these
- d. 19
- e. 10

Your answer is incorrect.

The correct answer is:
55

Question 8

Not answered

Marked out of 1.00

Suppose you wish to use the Principle of Mathematical Induction to prove

P(n): $1 \times 1! + 2 \times 2! + 3 \times 3! + \ldots + n \times n! = (n + 1)! - 1$ for all integers $n > 0$.

Write P(3).

- a. 23
- b. $1 \times 1! + 2 \times 2! + 3 \times 3!$
- c. None of these
- d. $3 \times 3!$
- e. $1 \times 1! + 2 \times 2! + 3 \times 3! = 4! - 1$

Your answer is incorrect.

The correct answer is:
$1 \times 1! + 2 \times 2! + 3 \times 3! = 4! - 1$

Question **9**

Not answered

Marked out of 1.00

Given the function

$$A(m,n) = \begin{cases} 2n & \text{if } m = 0 \\ 0 & \text{if } m \geq 1 \text{ and } n = 0 \\ 2 & \text{if } m \geq 1 \text{ and } n = 1 \\ A(m-1, A(m, n-1)) & \text{if } m \geq 1 \text{ and } n \geq 2 \end{cases}$$

Find A(1, 2)

- a. 1
- b. 0
- c. 2
- d. 4
- e. None of these

Your answer is incorrect.

The correct answer is:
4

Question **10**

Not answered

Marked out of 1.00

Suppose you wish to prove that the following is true for all positive integers *n* by using the Principle of Mathematical Induction:

P(n): 2 + 4 + 6 + ... + 2n = n·(n + 1)

Write P(4)

- a. 2 + 4 = 6
- b. 2 + 4 + 6 + 8 = 4·5
- c. 8
- d. None of these
- e. 2 + 4 + 6 + 8

Your answer is incorrect.

The correct answer is:
2 + 4 + 6 + 8 = 4·5

Question **11**

Not answered

Marked out of 1.00

Give a recursive definition with initial condition(s) of the set A = {1, 3, 9, 27, 81, ...}.

Which one is true?

(i) $1 \in A; x \in A \to 3x \in A.$
(ii) $1 \in A; x \in A \to 3^x \in A.$

- a. Only (ii)
- b. Neither
- c. Only (i)
- d. Both

Your answer is incorrect.

The correct answer is: Only (i)

Question **12**

Not answered

Marked out of 1.00

Give a recursive definition with initial condition(s) of the sequence 1, 3, 4, 7, 11, 18, 29, ...

Which one is true?

(i) Basis step: $a_1 = 1$, $a_2 = 3$.
Recursive step: $a_n = a_{n-1} + a_{n-2}$, for n > 2.
(ii) Basis step: $a_1 = 1$, $a_2 = 3$.
Recursive step: $a_{n+2} = a_n + a_{n+1}$, for n > 2.

a. Neither

b. Only (ii)

c. Both

d. Only (i)

Your answer is incorrect.

The correct answer is: Only (i)

Question **13**

Not answered

Marked out of 1.00

Use the Principle of Mathematical Induction to prove that $2 \mid (n^2 + 3n)$ for all $n \geq 1$.
Make a correct order of a proof by Induction.

(1) Suppose for every $k \geq 1$, $2 \mid k^2 + 3k$ and $2 \mid 2(k+2)$.
$2 \mid 1^2 + 3 \cdot 1$, which is true since $2 \mid 4$.
(2) We have $(k+1)^2 + 3(k+1) = (k^2 + 3k) + 2(k+2)$, which is divisible by 2.
(3) $2 \mid 1^2 + 3 \cdot 1$, which is true since $2 \mid 4$
(4) Therefore, by Induction, $2 \mid (n^2 + 3n)$ for all $n \geq 1$.

- a. (3), (1), (2), (4)
- b. (3), (2), (1), (4)
- c. (4), (3), (1), (2)
- d. (1), (2), (3), (4)
- e. None of these

Your answer is incorrect.

The correct answer is:
(3), (1), (2), (4)

Question **14**

Not answered

Marked out of 1.00

Give a recursive definition with initial condition(s) of
f(n) = (n - 1)!, n = 1, 2, 3, ...

- a. f(1) = 1, and f(n) = (n-1)f(n-1) for n > 1
- b. f(1) = 1, and f(n) = nf(n-1) for n > 1
- c. f(1) = 1, and f(n) = (n-1)f(n-2) for n > 1
- d. None of these
- e. f(1) = 0, and f(n) = (n-1)f(n-1) for n > 1

Your answer is incorrect.

The correct answer is: f(1) = 1, and f(n) = (n-1)f(n-1) for n > 1

Question **15**

Not answered

Marked out of 1.00

Suppose you wish to prove that the following is true for all positive integers *n* by using the Principle of Mathematical Induction:

P(n): $1 + 3 + 5 + \ldots + (2n - 1) = n^2$.

Write P(3)

- a. $1 + 3 + 5 = 3^2$
- b. $1 + 3 + 5$
- c. 3
- d. 9
- e. None of these

Your answer is incorrect.

The correct answer is:
$1 + 3 + 5 = 3^2$

Question **16**

Not answered

Marked out of 1.00

Give a recursive definition of the set

A = {1, 5, 25, 125, 625, ...}

Which one is true?

(i) $1 \in A; x \in A \to 5x \in A$

(ii) $1 \in A; x \in A \to 5^x \in A$

- a. Both
- b. Only (ii)
- c. Neither
- d. Only (i)

Your answer is incorrect.

The correct answer is:
Only (i)

Question **17**

Not answered

Marked out of 1.00

Consider the following procedure

procedure *tinh*(m, *n*: non-negative integer)

if *n* = 0 **then** *return m*

else return {*1* + *tinh*(m, *n* - 1)}

Given m = 13, n= 5, what will be the output of the algorithm?

- a. 12
- b. None of these
- c. 65
- d. 8
- e. 18

Your answer is incorrect.

The correct answer is:
18

Question **18**

Not answered

Marked out of 1.00

Consider the set A defined recursively by

$1 \in A$; $3 \in A$,

$x \in A \rightarrow x + 4 \in A$

Find {1, 2, 3, 4, 5, 6, 7, 8, 9, 10} - A

- a. None of these
- b. {1, 3, 5, 7, 9}
- c. {2, 4, 6, 8, 10}
- d. {2, 4, 5, 6, 7, 8, 9, 10}

Your answer is incorrect.

The correct answer is:
{2, 4, 6, 8, 10}

Question **19**

Not answered

Marked out of 1.00

Give a recursive definition with initial condition(s) of the sequence $a_1 = 16$, $a_2 = 13$, $a_3 = 10$, $a_4 = 7$, ...

a. None of these

b. $a_1 = 16$, $a_{n+1} = a_n - 3$, for n > 1

c. $a_1 = 16$, $a_n = a_{n-1} - 3$ for n > 1

d. $a_1 = 16$, $a_n = 3 - a_{n-1}$, for n > 1

Your answer is incorrect.

The correct answer is: $a_1 = 16$, $a_n = a_{n-1} - 3$ for n > 1

Question **20**

Not answered

Marked out of 1.00

Consider the following procedure

procedure *tinh*(*a*: real number, *n*: positive integer)

if *n* = 1 **then** *return a*

else return {*a* + *tinh*(*a*,*n* - 1)}

Given a = 3.5, n= 4, what will be the output of the algorithm?

- a. 10
- b. 7.5
- c. None of these
- d. 14
- e. 6.5

Your answer is incorrect.

The correct answer is:
14

Question **21**

Not answered

Marked out of 1.00

Given a recursive definition of the set of strings S

$1 \in S; x \in S \rightarrow x11 \in S$

Which one is true?

(i) $1111 \in S$
(ii) $11111 \in S$

- a. Neither
- b. Only (ii)
- c. Both
- d. Only (i)

Your answer is incorrect.

The correct answer is:
Only (ii)

Question 22

Not answered

Marked out of 1.00

Suppose you wish to use the Principle of Mathematical Induction to prove that

$$1+3+9+27+\ldots+3^n=\frac{3^{n+1}-1}{2} \quad \text{for all } n \geq 0.$$

Write P(1), the statement when n = 1.

- a. $1 + 3$
- b. $1 = (3^1 - 1)/2$
- c. None of these
- d. 1
- e. $1 + 3 = (3^2 - 1)/2$

Your answer is incorrect.

The correct answer is:
$1 + 3 = (3^2 - 1)/2$

Question 23

Not answered

Marked out of 1.00

Give a **recursive definition** with initial condition(s) of
f(n) = 5n + 7, n = 1, 2, ...

- a. f(n) = f(n-1) + 5
- b. None of these
- c. f(1) = 12, and f(n + 1) = f(n) + 5 for n > 1
- d. f(1) = 12, and f(n) = 5f(n-1) + 7 for n > 1
- e. f(1) = 12, and f(n) = f(n-1) + 5 for n > 1

Your answer is incorrect.

f(n) = 5n + 7, n = 1, 2, ...

BASIS STEP. f(1) = 12

RECURSIVE STEP. f(n) = f(n -1) + 5, if n > 1

f(n) = 5n + 7

f(n) = 5(n-1) + 7 = 5n + 2

==> f(n) = f(n -1) + 5

The correct answer is: f(1) = 12, and f(n) = f(n-1) + 5 for n > 1

Question **24**

Not answered

Marked out of 1.00

Consider the following procedure

procedure *T*(n: non-negative integer)

if *n* < 3 **then** *return n*

else return {2n + *T(n-1) - T(n-2)*}

Find T(3), T(4), T(5)

- a. 7, 13, 14
- b. None of these
- c. 5, 7, 9
- d. 8, 12, 14
- e. 7, 13, 16

Your answer is incorrect.

The correct answer is:
7, 13, 16