Started on	Saturday, 24 September 2022, 1:00 PM
State	Finished
Completed on	Saturday, 24 September 2022, 1:00 PM
Time taken	10 secs
Marks	0.00/27.00
Grade	**0.00** out of 10.00 (**0**%)

Question **1**

Not answered

Marked out of 1.00

Find f ◦ g, where f (x) = x^2 - 5 and g(x) = x + 2, where f and g are functions from R to R.

a. None of these

b. (f ◦ g)(x) =(x^2 - 5)(x+ 2)

c. (f ◦ g)(x) = x^2 - 3

d. (f ◦ g)(x) = x^2 +4x - 1

e. None of the others

The correct answer is: (f ◦ g)(x) = x^2 +4x - 1

Question 2

Not answered

Marked out of 1.00

Consider the set defined by

$A_n = \{1, 2, 3, ..., n\}$, n = 1, 2, ...

What is $A_7 - A_4$?

- a. {4, 5, 6, 7}
- b. None of the others
- c. {1, 2, 3}
- d. {3}
- e. {5, 6, 7}

The correct answer is: {5, 6, 7}

Question 3

Not answered

Marked out of 1.00

List the first 3 terms of the sequence whose n^{th} term is the sum of the first n positive integers.

a. 1, 2, 3

b. 1, 3, 5

c. 1, 2, 5

d. 1, 3, 6

The correct answer is: 1, 3, 6

Question **4**

Not answered

Marked out of 1.00

Determine whether each of these functions is a bijection from R to R.

a) $f(x) = -5x + 3$

b) $f(x) = -x^2 + 7$

- a. Not a bijection, Not a bijection
- b. Bijection, Bijection
- c. Bijection, Not a bijection
- d. Not a bijection, Bijection
- e. None of the others

The correct answer is: Bijection, Not a bijection

Question 5

Not answered

Marked out of 1.00

Find the next two terms of the sequence 2, 5, 8, 11, 14, 17, 20, ...

a. None of the others

b. 23, 26

c. 23, 27

d. 24, 27

e. 22, 25

The correct answer is: 23, 26

Question **6**

Not answered

Marked out of 1.00

Which one is true?

(i) $A \oplus A = \emptyset$

(ii) $A \oplus \emptyset = A$

a. (i) only

b. Both (i) and (ii)

c. (ii) only

d. Neither (i) nor (ii)

The correct answer is: Both (i) and (ii)

Question 7

Not answered

Marked out of 1.00

Which one is true?

(i) $\{ a \} \in \{ b, \{a, c\} \}$

(ii) $\varnothing \subseteq \{a, b\}$

a. (ii) only

b. Neither (i) nor (ii)

c. (i) only

d. Both (i) and (ii)

The correct answer is: (ii) only

Question 8

Not answered

Marked out of 1.00

Suppose that the universal set is U = {1, 2, 3, 4, 5, 6, 7}.

Express the set {1, 4, 5, 7} with bit strings where the i^{th} bit in the string is 1 if i is in the set and 0 otherwise.

- a. 10010101
- b. None of the others
- c. 1111000
- d. 0001111
- e. 1001101

The correct answer is: 1001101

Question 9

Not answered

Marked out of 1.00

Which one is true?

(i) $A \oplus B = (A \cup B) - (A \cap B)$.

(ii) $A \oplus B = (A - B) \cup (B - A)$.

a. Only (ii)

b. Both

c. Neither

d. Only (i)

The correct answer is: Both

Question 10

Not answered

Marked out of 1.00

Which rules are functions?

(i) $f: \mathbf{R} \to \mathbf{R}$ where $f(x) = \begin{cases} x^2 & \text{if } x \le 2 \\ x-1 & \text{if } x \ge 4 \end{cases}$

(ii) $G: \mathbf{R} \to \mathbf{R}$ where $G(x) = \begin{cases} x+2 & \text{if } x \ge 0 \\ x-1 & \text{if } x \le 4 \end{cases}$

a. Neither

b. Only (ii)

c. Only (i)

d. Both

Your answer is incorrect.

(i) f(3) is undefined.
(ii) G has more than one values when x = 2.

The correct answer is:
Neither

Question **11**

Not answered

Marked out of 1.00

The **successor** of the set A is the set A ∪ {A}.

Find the **successor** of {1, 2}.

a. {1, 2}

b. {{1, 2}}

c. {1, 2, {1, 2}}

d. None of these

e. {1, 2, {1}, {2}}

The correct answer is: {1, 2, {1, 2}}

Question 12

Not answered

Marked out of 1.00

List the first 4 terms of the sequence whose n^{th} term is the largest integer k such that $2^k \leq n$.

a. 0, 1, 1, 1

b. 0, 1, 2, 3

c. 0, 1, 1, 2

d. 0, 1, 2, 2

e. None of these

The correct answer is: 0, 1, 1, 2

Question 13

Not answered

Marked out of 1.00

What is the cardinality of each of these sets?

a) The power set of the set {a, b, ∅}

b) The Cartesian product {1, 0} x {0, 1, 2}

- a. 3, 6
- b. 8, 3
- c. 3, 3
- d. 8, 6

The correct answer is: 8, 6

Question **14**

Not answered

Marked out of 1.00

Determine whether each of these sets is finite, countably infinite or uncountable.

A: the set of integers with absolute value less than 1,000,000,000

B: the set of odd negative integers

a. A : finite, B: countably infinite

b. A : countably infinite, B: countably infinite

c. A : uncountable, B: uncountable

d. A : finite, B: uncountable

Your answer is incorrect.

The correct answer is:
A : finite, B: countably infinite

Question 15

Not answered

Marked out of 1.00

Compute each of these (double) sums.

$$\sum_{j=0}^{8} (1 + (-1)^j)$$

$$\sum_{i=1}^{3} \sum_{j=0}^{2} i$$

- a. 10, 9
- b. 20, 9
- c. 0, 3
- d. None of these

The correct answer is: 10, 9

Question **16**

Not answered

Marked out of 1.00

Suppose $a_n = 1+ 3 + 5 + ... + (2n-1)$, n = 1, 2, 3, ...

Find a_1, a_2, a_3, a_4.

- a. 1, 4, 9, 16
- b. None of the others
- c. 1, 3, 5, 7
- d. 1, 4, 9, 13

The correct answer is: 1, 4, 9, 16

Question 17

Not answered

Marked out of 1.00

Determine whether each of these statements is true or false.

$x \in \{ \{x\} \}$

$\{x\} \subseteq \{ \{x\} \}$

$\{x\} \in \{ \{x\} \}$

a. False, False, False

b. True, True, True

c. False, False, True

d. True, False, True

The correct answer is: False, False, True

Question **18**

Not answered

Marked out of 1.00

Consider the sequence $\{a_n\}$, where a_n is defined by

$a_0 = 7$, and $a_n = a_{n-1} - n$, if $n > 0$.

What are the terms a_1, a_2, and a_3 ?

a. None of these

b. 6, 4, 2

c. 6, 5, 3

d. 6, 4, 1

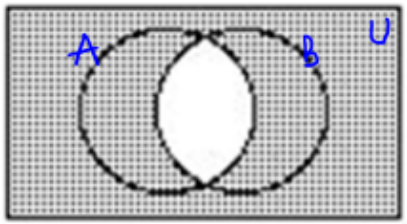
e. 6, 5, 4

The correct answer is: 6, 4, 1

Question 19

Not answered

Marked out of 1.00



The **shaded region** in the Venn diagram indicates ___

$(i)\ \overline{A \cap B}$

$(ii)\ \overline{A} \cap \overline{B}$

$(iii)\ \overline{A \cup B}$

a. None of these

b. (i)

c. (ii)

d. (iii)

The correct answer is: (i)

Question 20

Not answered

Marked out of 1.00

Consider the function f: R → R, where f(x) = (x-3)(x + 1).

Which of the following statements is/are true?

(i) f is one-to-one

(ii) f is a bijection

a. Neither (i) nor (ii)

b. (ii) only

c. Both (i) and (ii)

d. (i) only

The correct answer is: Neither (i) nor (ii)

Question 21

Not answered

Marked out of 1.00

Find the next two terms of the sequence 1, 4, 5, 9, 14, 23, ...

a. 27, 50

b. 37, 60

c. None of the others

d. 47, 70

e. 37, 45

The correct answer is: 37, 60

Question 22

Not answered

Marked out of 1.00

Suppose that the universal set is U = {1, 2, 3, 4, 5, 6, 7, 8}, find the set specified by the bit string 01100101.

a. {1, 4, 5}

b. {2, 3, 6, 8}

c. {1, 2, 5, 7}

d. {3, 4, 6, 8}

The correct answer is: {2, 3, 6, 8}

Question 23

Not answered

Marked out of 1.00

Which one is true?

(i) $a \in \{ b, \{a, c\} \}$

(ii) $\varnothing \in \{a, b\}$

- a. Both (i) and (ii)
- b. (ii) only
- c. Neither (i) nor (ii)
- d. (i) only

The correct answer is: Neither (i) nor (ii)

Question 24

Not answered

Marked out of 1.00

Determine whether each of these sets is finite, countably infinite, or uncountable.

A: the set of real numbers between 0 and 1

B: the set of odd negative integers

a. uncountable, uncountable

b. countably infinite, countably infinite

c. finite, uncountable

d. countably infinite, uncountable

e. uncountable, countably infinite

The correct answer is: uncountable, countably infinite

Question 25

Not answered

Marked out of 1.00

Determine whether f : Z × Z → Z is onto if

i) f(m, n) = m - 2n

ii) f(m, n) = |n|

a. not onto, onto

b. onto, not onto

c. onto, onto

d. not onto, not onto

The correct answer is: onto, not onto

Question 26

Not answered

Marked out of 1.00

Suppose that A is the set of freshmen at your school and B is the set of students in discrete mathematics at your school.
Express the set of freshmen at your school who are not taking discrete mathematics in terms of A and B.
Which one is true?

$(i)\ A \cap B$

$(ii)\ A \cup B$

$(iii)\ A - B$

$(iv)\ B - A$

a. (ii)

b. (i)

c. (iv)

d. (iii)

The correct answer is: (iii)

Question 27

Not answered

Marked out of 1.00

Find the general term of the sequence $\{a_n\}$
if $a_1 = 1, a_2 = 5, a_3 = 9, a_4 = 13, a_5 = 17, a_6 = 21, \ldots$

a. None of these

b. $a_n = 4n + 1$

c. $a_n = 4n - 3$

d. $a_n = 2n + 2$

e. $a_n = n + 4$

The correct answer is: $a_n = 4n - 3$