MATHS

BOOKS - ACCURATE PUBLICATION

RELATION AND FUNCTIONS

Questions Carrying 1 Mark Type I

1. Let R be the relation in the set N given by $R = \{(a, b) : a - b = 5, a > 7\}$, choose correct answer :

A. $(7, 2) \in R$

B. $(15, 12) \in R$

C. $(9, 4) \in R$

D. $(8, 2) \in R$

Answer: C

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2. Let R be the relation in the set N given by $R = \{(a, b) : a = b-2, b > 6\}$. Choose the correct answer:

A. $(2, 4) \in R$

B. $(3, 8) \in R$

C. $(6, 8) \in R$

D. $(8, 7) \in R$

Answer: C

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3. Let A = {1, 2, 3}. Then number of relations containing (1, 2) and (1, 3) which are reflexive and symmetric but not transitive is

A. 1

B. 2

C. 3

D. 4

Answer: B

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4. If $A = \{a, b, c, d\}$ then a relation

$R = \{(a, a), (b, b), (c, c), (d, d)\}$ on A is :
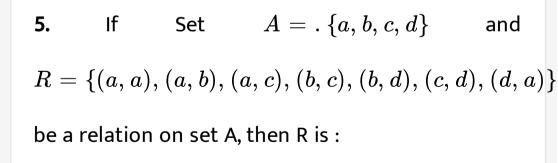
A. Symmetric

B. Transitive

C. Reflexive

D. None of these

Answer: C

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5. If Set $A = . \{a, b, c, d\}$ and

$R = \{(a, a), (a, b), (a, c), (b, c), (b, d), (c, d), (d, a)\}$

be a relation on set A, then R is :

A. Reflexive

B. Symmetric

C. Transitive

D. None of these

Answer: D

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6. If Set $A = \{a, b, c, d\}$, then a relation $R = \{(a, b), (b, a), (a, a)\}$ on A is :

A. Symmetric and transitive only

B. Reflexive and transitive only

C. Symmetric only

D. Transitive only

Answer: A

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7. Let R be the relation in the set {1, 2, 3, 4} given by

R = {(1, 2), (2, 2), (1, 1), (4,4), (1, 3), (3, 3), (3, 2)}.

Choose the correct answer.

A. R is reflexive and symmetric but not transitive

B. R is reflexive and transitive but not symmetric

C. R is symmetric and transitive but not reflexive

D. R is an equivalence relation.

Answer: A

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8. Let $A = \{1, 2, 3\}$ Then number of equivalence relations containing (1, 2) is:

A. 1

B. 2

C. 3

D. 4

Answer: B

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9. The range of function $f(x) = \dfrac{|x - 1|}{x - 1}$

A. $\{-1, 1\}$

B. $\{-1, 2\}$

C. $\{-2, 2\}$

D. None of these

Answer: D

10. Let $f: R - R$ be defined as $f(x) = x^4$, then (a) f is one-one (b) f is many-one onto (c) f is one-one but not onto (d) f is neither one-one nor onto

A. f is one-one onto

B. f is many-one onto

C. f is one-one but not onto

D. f is neither one-one nor onto.

Answer: D

11. Let $f: R \rightarrow R$ be defined as $f(x) = 3x$ Choose the correct answer.

    A. f is one-one onto

    B. f is many-one onto

    C. f is one-one but not onto

    D. f is neither one-one nor onto.

Answer: A

12. Let T be the set of all triangles in a plane with R a relation in T given by : $R = \{(T_1, T_2) : T_1$ is congruent to T_2}. Show that R is an equivalence relation.

A. reflexive but not transitive

B. transitive but not symmetric

C. equivalence

D. none of these

Answer: C

13. Consider the non-empty set consisting of children in a family and a relation R defined as aRb if a is brother of b. Then R is

    A. symmetric but not transitive

    B. transitive but not symmetric

    C. neither symmetric nor transitive

    D. both symmetric and transitive

Answer: B

14. The maximum number of equivalence relations

on the set A = {1, 2, 3} are

A. 1

B. 2

C. 3

D. 5

Answer: C

15. If a relation R on the set {1, 2, 3} be defined by R = {(1, 2)}, then R is

A. reflexive

B. transitive

C. symmetric

D. none of these

Answer: B

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16. Let R be a relation defined by R = {(a, b) : $a \geq b$}, where a and b are real numbers, then R is

    A. an equivalence relation

    B. reflexive, transitive but not symmetric

    C. symmetric, transitive but not reflexive

    D. neither transitive nor reflexive but symmetric

Answer: B

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17. Let A = {1, 2, 3} and consider the relation, R = {1, 1}, (2, 2), (3, 3), (1, 2), (2, 3), (1, 3). Then R is

    A. reflexive but not symmetric

    B. reflexive but not transitive

    C. symmetric and transitive

    D. neither transitive, nor transitive

Answer: D

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18. If the set A contains 5 elements and the set B contains of 6 elements, then the number of one-one and onto mappings from A to B is

A. 720

B. 120

C. 0

D. none of these

Answer: C

19. Let A = {1, 2, 3, ... n} and B = {a, b}. Then the number of surjections from A into B is

A. $^{n}P_2$

B. $2^n - 2$

C. $2^n - 1$

D. none of these

Answer: C

20. Let f:R $\rightarrow$ R be defined by $f(x) = \dfrac{1}{x} \forall x \in R.$

Then f is

A. one-one

B. onto

C. bijective

D. f is not defined

Answer: D

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21. Which of the following function from Z to itself are bijections?

A. $f(x) = x^3$

B. $f(x) = x + 2$

C. $f(x) = 2x + 1$

D. $f(x) = x^2 + 1$

Answer: C

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22. Let $f : [2, \infty) \to R$ be the function defined by $f(x) = x^2 - 4x + 5$, then the range of f is

A. R

B. $[1, \infty)$

C. $[4, \infty)$

D. $[5, \infty)$

Answer: D

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23. Let R be a relation on the set N of natural numbers defined by n R m if n divides m. Then R is

    A. Reflexive and symmetric

    B. Transitive and symmetric

    C. Equivalence

    D. Reflexive, transitive but not symmetric

Answer: D

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24. Let L denote the set of all straight lines in a plane. Let a relation R be defined by l Rm if and only if l is perpendicular to m $\forall$ l, m $\in$ 1. Then R is

    A. reflexive

    B. Symmetric

    C. Transitive

    D. none of these

Answer: B

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25. Let N be the set of natural numbers and the function $f: N \rightarrow N$ be defined by $f(n) = 2n + 3 \; \forall \; n \in N$. Then f is

A. surjective

B. injective

C. bijective

D. none of these

Answer: B

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26. If n(A) = 3 and n(B) = 4, then the number of injective mapping that can be defined from A to B

(a)144 (b)12 (c)24 (d)64

A. 144

B. 12

C. 24

D. 64

Answer: C

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27. Let $f: R \to R$ defined by $f(x) = x^2 + 1$, then pre image of 17 and -3 respectively are

A. $\phi, \{-4, 4\}$

B. $\{3, -3\}, \phi$

C. $\{4, -4\}, \phi$

D. $\{4, -4\}, \{-2, -2\}$

Answer: C

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28. For real numbers x and y, we write x R y $\Leftrightarrow$ x - y + $\sqrt{2}$ is an irrational number. Then, the relation R is

A. reflexive

B. symmetric

C. transitive

D. none of these

Answer: A

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29. Let T be the set of all triangles in the Euclidean plane, and let a relation R on T be defined as a R b if a is congruent to b $\forall$ a,b $\in$ T. Then R is

    A. reflexive but not transitive

    B. transitive but not symmetric

    C. equivalence

    D. None of these

Answer: C

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30. Consider the non-empty set consisting of children in a family and a relation R defined as aRb if a is brother of b. Then R is

   A. symmetric but not transitive

   B. transitive but not symmetric

   C. neither symmetric nor transitive

   D. both symmetric and transitive

Answer: B

31. The maximum number of equivalence relations on the set A = {1, 2, 3} are

A. 1

B. 2

C. 3

D. 5

Answer: D

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32. If a relation R on the set {1, 2, 3} be defined by R = {(1, 2)}, then R is

A. reflexive

B. transitive

C. symmetric

D. none of these

Answer: B

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33. Let R be a relation defined by R = {(a, b) : $a \geq b$}, where a and b are real numbers, then R is

    A. an equivalent relation

    B. reflexive, transitive but not symmetric

    C. symmetric, transitive but not reflexive

    D. neither transitive nor reflexive but symmetric

Answer: B

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34. Let A = {1, 2, 3} and consider the relation, R = {1, 1}, (2, 2), (3, 3), (1, 2), (2, 3), (1, 3). Then R is

A. reflexive but not symmetric

B. reflexive but not transitive

C. symmetric and transitive

D. neither symmetric, nor transitive

Answer: A

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35. If the set A contains 5 elements and the set B contains 6 elements, then the number of one-one and onto mappings from A to B is

A. 720

B. 120

C. 0

D. none of these

Answer: C

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36. The number of surjections from A = {1, 2, ..., n}, $n \geq 2$ onto B = {a, b} is

A. $^{n}P_2$

B. $2^n - 2$

C. $2^n - 1$

D. None of these

Answer: B

37. Let f:R $\rightarrow$ R be defined by $f(x) = \dfrac{1}{x} \forall x \in R.$

Then f is

   A. one-one

   B. onto

   C. bijective

   D. f is not defined

Answer: D

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38. Which of the following function from Z to itself are bijections?

A. $f(x) = x^3$

B. $f(x) = x + 2$

C. $f(x) = 2x + 1$

D. $f(x) = x^2 + 1$

Answer: B

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39. Let $f : [2, \infty) \rightarrow R$ be the function defined by $f(x) = x^2 - 4x + 5$, then the range of f is

A. R

B. $[1, \infty]$

C. $[4, \infty)$

D. $[5, \infty)$

Answer: B

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Questions Carrying 1 Mark Type Ii

1. Let the relation R be defined in N by aRb if 2 a + 3 b = 30. Then R = ...

2. Let the relation R be defined on the set

$$A = \{1, 2, 3, 4, 5\} \ \ \text{by} \ \ R = \{(a, b) : |a^2 - b^2| < 8\}:$$

Then R is given by ....

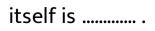**3.** Consider the set A = {1, 2, 3} and R be the smallest equivalence relation on A, then R = ...

4. The domain oof the function f:R $\rightarrow$ R defined by $f(x) = \sqrt{x^2 - 3x + 2}$ is ....

5. Consider the set A containing n elements. Then, the total number of injective functions from a onto
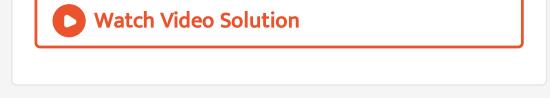
itself is ....

6. Let Z be the set of integers and R be the relation defined in Z such that a R b if a - b is divisible by 3. Then R partitions the set Z into .... pairwise disjoint subsets.

7. Let the relation R be defined in N by aRb if 2 a + 3 b = 30. Then R = ...

8. Let the relation R be defined on the set

$A = \{1, 2, 3, 4, 5\}$ by $R = \{(a, b) : |a^2 - b^2| < 8\}$:

Then R is given by ....

Questions Carrying 1 Mark Type Iii

1. Consider the set A = {1, 2, 3} and the relation R =

{(1, 2), (1, 3)}. R is a transitive relation.

2. Let A be a finite set. Then, each injective function from A into itself is not surjective.

3. Every relation which is symmetric and transitive is also reflexive.

4. An integer m is said to be related to another integer n if m is a integral multiple of n. This relation in Z is reflexive, symmetric and transitive.

5. Let A = {0, 1} and N be the set of natural numbers. Then the mapping f : N $\rightarrow$ A defined by f(2n - 1) = 0, f(2n) = 1, $\forall n \in N$, is onto.

6. The relation R on the set A = {1, 2, 3} defined as R = {(1, 1), (1, 2), (2, 1), (3, 3)} is reflexive, symmetric and transitive.

7. A relation R in A is said to be transitive if a R b and b R c $\Rightarrow$ a R c

8. The relation R in the set {1, 2, 3} given by R = {(1, 2), (2, 1)} is not symmetric.

9. Let R be the relation in the set N given by $R = \{(a, b) : a = b - 2, b > 6\}$. Choose the correct answer:

10. A function f:X $\rightarrow$ Y is said to be bijective, if f is both one-one and onto.

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11. Show that the function f: $N \rightarrow N$ given by f(x)= 3x is one-one but not onto.

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