Questions

1. If $\left(\dfrac{x}{3} + 1, y - \dfrac{2}{3}\right) = \left(\dfrac{5}{3}, \dfrac{1}{3}\right)$, find the values of x and y

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2. If the set A has 3 elements and the set B = {3, 4, 5}, then find the number of elements in $(A \times B)$.

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3. If G = {7, 8} and H = {5, 4, 2}, find $G \times H$ and $H \times G$.

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4. If G = {7, 8} and H = {5, 4, 2}, find $G \times H$ and $H \times G$.

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5. If $A \times B$ = {(a, x).(a , y). (b, x), (b, y)}. Find A and B.

6. If A= {-1, 1}, find $A \times A \times A$.

7. Let A= {1, 2}, B = {1, 2, 3, 4}, C = {5, 6} andD = {5, 6, 7, 8}.

Verify that $A \times (B \cap C) = (A \times B) \cap (A \times C)$.

8. Let A= {1, 2}, B = {1, 2, 3, 4}, C = {5, 6} andD = {5, 6, 7, 8}.

Verify that $A \times C$ is a subset of $B \times D$.

9. Let A = {1, 2} and B = {3, 4}. Write $A \times B$. How many subsets will $A \times B$ have? List them.

10. Let A = {1, 2, 3,...,14}. Define a relation R from A to A by R = {(x, y) : 3x-y= 0, where x,y $\in$ A}. Write down its domain, codomain and range.

11. A = {1, 2, 3, 5} andB= {4, 6, 9}. Define a relation R Ifom A to B by R = {(x,y): the difference between x and y is odd,

$x \in A, y \in B$}. Write R in roster form.

12. Determine the domain and range of the relation R defined by R = {(x, x + 5) : x $\in$ {0, 1, 2, 3, 4, 5}}.

13. Let A = {x, y,z} and B = {1,2}. Find the number of relations from A to B.

14. Which of the following relation are function ? Given reason

$\{(2, 1), (5, 1), (8, 1), (11, 1), (14, 1), (17, 1)\}$

15. Which of the following relations are functions? Give reasons. If it is a function, determine its domain and range. $\{(1, 3), (1, 5), (2, 5)\}$.

16. Find the range of - $|x|$

17. Find the domain and range of the following real function:- $f(x) = \sqrt{9 - x^2}$

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18. Find the range of the following function:- $f(x) = 2 - 3x, x \in R, x > 0.$

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19. Find the range of the following function:- $f(x) = x^2 + 2$, x is a real number.

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1. Let f g : $R \to R$ be defined, respectively by $f(x) = x + 1, g(x) = 2x - 3$. Find $f + g$, $f - g$ and $\dfrac{f}{g}$.

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2. Let $f(x) = \sqrt{x}$ and $g(x) = x$ be two function defined over the set of non-negative real numbers . Find $(f + g)(x), (f - g)(x), (fg)(x)$ and $\left(\dfrac{f}{g}\right)(x)$

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3. The relation 'f' is defined by $f(x) = \begin{cases} x^2 & 0 \le x \le 3 \\ 3x & 3 \le x \le 10 \end{cases}$

The relation 'g' is defined by $g(x) = \begin{cases} x^2 & 0 \le x \le 2 \\ 3x & 2 \le x \le 10 \end{cases}$

Show that 'f' is a function and 'g' is not a function.

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4. Find the domain of the function $f(x) = \dfrac{x^2 + 2x + 1}{x^2 - 8x + 12}$.

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5. Find the domain of the function $f(x) = \dfrac{x^2 + 3x + 5}{x^2 - 5x + 4}$

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6. Find the domain and the range of the real function 'f'

defined by $f(x) = \sqrt{(x-1)}$.

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7. Find the domain and the range of the real function 'f'

defined by $f(x) = |x - 1|$.

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8. Find the domain and range of real function f defined by

$f : R \rightarrow R$ such that $f = \left\{ \left(x, \dfrac{x^2}{1+x^2} \right) : x \in R \right\}$

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9. Let f = {(1,1), (2,3), (0,-1), (-1, -3)} be a function from Z to Z defined by $f(x) = ax + b$, for some integers a, b. Determine a, b.

10. Let R be a relation from N to N defined by $R = \{(a, b) : a, b \in N \text{ and } a = b^3\}$. Are the following true ?

$(a, a) \in R,$ for all $a \in N$

11. Let R be a relation from N to N defined by $R = \{(a, b) : a, b \in N \text{ and } a = b^3\}$. Are the following

true ?

$$(a, b) \in R \ \text{implies} \ (b, a) \in R$$

12. Let R be a relation from N to N defined by R = {(a, b) : a, b $\in$ N and a= b^2}. Is the following true?

$$(a, b) \in R, (b, c) \in R \ \text{implies} \ (a, c) \in R. \ \text{Justify your}$$

answer

MCQ

1. If A = $\{2, 4, 5\}$, B $= \{7, 8, 9\}$ then $n(A \times B)$ is equal to

A. 6

B. 9

C. 3

D. 0

Answer: B

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2. If A = {0,1} and B = {1,0} , then $A \times B$ is equal to

A. $\{0, 1, 1, 0\}$

B. $\{(0, 1), (1, 0)\}$

C. $\{0, 0\}$

D. $\{(0, 1), (0, 0), (1, 1), (1, 0)\}$

Answer: D

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3. Let O (A) = m, O(B) = n . Then the number of relations

from A to B is

A. mn

B. m + n

C. 2^{mn}

D. 2^{m+n}

Answer: C

4. A relation R on a set A is called an equivalence relation iff

    A. it is reflexive

    B. it is symmetric

    C. it is transitive

    D. it is reflective, symmetric and transitive

Answer: D

5. If r is a relation on a finite set having n elements, then the number of relation on A is

A. 2^n

B. 2^{n^2}

C. n^2

D. n^n

Answer: B

6. Let A be a set containing 10 distinct elements. Then the total number of distinct functions from A to A is:

A. $10!$

B. 10^{10}

C. 2^{10}

D. $2^{10} - 1$

Answer: B

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7. The domain of the function

$f(x) = \sqrt{x - 1} + \sqrt{6 - x}$ is

A. $[1, \infty)$

B. $(-\infty, 6)$

C. [1,6]

D. none of these

Answer: C

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8. Find domain for $y = \dfrac{1}{\sqrt{|x| - x}}$.

A. $[1, \infty)$

B. $(-\infty, 0)$

C. $(-\infty, 0]$

D. $[1, \infty)$

Answer: B

9. If the domain of the function $f(x) = x^2 - 6x + 7$ is $(-\infty, \infty)$, then the range of function is

A. (∞, ∞)

B. $[-2, \infty)$

C. $(-2, \infty)$

D. $(-\infty, -2)$

Answer: B

10. The range of the function for real x of $y = \dfrac{1}{2 - \sin 3x}$

is

A. $\dfrac{1}{3} \le y \le 1$

B. $-\dfrac{1}{3} \le y < 1$

C. $-\dfrac{1}{3} > y > 1$

D. $\dfrac{1}{3} > y > 1$

Answer: A

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11. The range of $f(x) = \dfrac{1 + x^2}{x^2}$

A. $[0,1]$

B. (0,1]

C. $(1, \infty)$

D. $[1, \infty)$

Answer: C

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12. $f(x) = \dfrac{|x|}{x}, x \neq 0$ then the value of function

A. 1

B. 0

C. -1

D. $f(x) = \begin{cases} 1, & x > 0 \\ -1, & x < 0 \end{cases}$

Answer: D

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13. If $x \neq 1$ and $f(x) = \dfrac{x+1}{x-1}$ is a real function, then

$f(f(f(2)))$ is

A. 1

B. 2

C. 3

D. 4

Answer: C

14. If $f(x) = \dfrac{2x + 1}{3x - 2}$, then (fof) (2) is equal to

A. 1

B. 3

C. 4

D. none of these

Answer: D

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15. The relation R defined on N as

$\{(a, b) : a^2 + b^2 < 16\}$ is given by

A. $\{(1, 1), (1, 2), (1, 3), (1, 4), (1, 5)\}$

B. $\{(1, 1), (1, 2), (1, 3), (2, 3), (2, 4), (3, 2), (3, 3)\}$

C.

$\{(1, 1), (1, 2), (2, 1), (1, 3), (3, 1), (2, 2), (2, 3), (3, 2)\}$

D. none of these

Answer: C

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16. If

$A = \{0, 1\}B = \{1, 2\}, c = \{2, 3\}, \quad \text{then}(A \times B) \cap (A \times C)$

$=$

A. $\{(0, 1), (1, 2)\}$

B. $\{(0, 2), (1, 3)\}$

C. $\{(1, 2), (1, 3)\}$

D. $\{(0, 2), (1, 2)\}$

Answer: D

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17. If A be an empty set and B be a finite set having n elements then the total number of mappings from A to B is

   A. mn

   B. n

   C. 1

   D. none of these

Answer: C

18. If $f(x) = \dfrac{x-1}{x+1}$, then f (2 x) is

A. $\dfrac{f(x)+1}{f(x)+3}$

B. $\dfrac{3f(x)+1}{f(x)+3}$

C. $\dfrac{f(x)+3}{f(x)+1}$

D. $\dfrac{f(x)+3}{3f(x)+1}$

Answer: B

19. The domain of definition of the function f (x) = log |x| is

given by

    A. $x \neq 0$

    B. $x > 0$

    C. $x < 0$

    D. $x \in R$

Answer: D

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