MATHS

BOOKS - NEW JYOTHI MATHS (TAMIL ENGLISH)

RELATIONS AND FUNCTIONS

Examples

1. If $P = \{4, 3, 2\}$ and $q = \{5\}$, form the sets $P \times Q$ and $Q \times P$ are these two products equal ?

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2. if $A \times B = \{(1, 3)(1, 5)(2, 3)(2, 5)(3, 3)(3, 5)\}$

$I.$ find A and B

ii. Find $A \times A$

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3. Let A and B are two sets such that n(A) = 3 and n(B) =2 . If (x,1) , (y,2) and (z,1) are in $A \times B$, find A and B where x,y, z are distinct elements.

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4. Let $A = \{1, 2\}, B = \{1, 2, 3, 4\}, c = \{5, 6\}$ and $d = \{5, 6, 7, 8\}$ verify that

$A \times (B \cap C) = (A \times B) \cap (A \times C)$

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5. Let $A = \{1, 2\}, B = \{1, 2, 3\}, c = \{5, 6\}$ and $d = \{5, 6, 7\}$ verify that $A \times C$ is a subset of $B \times D$

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6. If $\left(\frac{x}{3}+1, y-\frac{5}{3}\right)=\left(\frac{7}{3}, \frac{1}{3}\right)$, find the values of x and y.

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

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

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9. The cartesian product $A \times A$ has 9 elements among which are found (-1,0) and (0,1) . Find the set A and the remaining elements of $A \times A$

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10. Let $A = \{1, 2, 3\}$ and $B = \{a, b\}$

write the universal relation from A to B .

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11. Let $A = \{1, 2, 3\}$ and $B = \{a, b\}$

what is the number of non empty relations from A to B

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12. Let $A = \{2, 3\}, B = \{4, 6\}$. let R be relation on A defined by

$R = \{(A, b), a \in A, b \in B, a$ divides b$\}$

find $A \times B$ and the number of relations from A to B .

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13. Let $A = \{2, 3\}, B = \{4, 6\}$. let R be relation on A defined by

$R = \{(a, b), a \in A, b \in B, a$ divides b$\}$

find the domain and range of R .

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14. Let $A = \{1, 2, 3, 4\}$ and R be relation on A defined by

R ={(a,b) : a,b, $\in$ A,B is exactly divisible by a }

write R in the roster form .

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15. Let $A = \{1, 2, 3, 4, 6\}$ and R be relation on A defined by

R ={(a,b) : a,b, $\in$ A,b is exactly divisible by a }

write the domain and range of R

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16. Let $A = \{1, 2, 3, 4\}, B = \{1, 4, 5\}$ be two sets . If R is the relation $'' < ''$ from A to B , then

Write R in roster form

Watch Video Solution

17. Let $A = \{1, 2, 3, 4\}, B = \{1, 4, 5\}$ be two sets . If R is the relation $'' < ''$ from A to B , then

Write the domain and range of R.

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18. Let $A = \{1, 2, 3, 4\}, B = \{1, 4, 5\}$ be two sets . If R is the relation $'' < ''$ find cartestian equation and r inverse.

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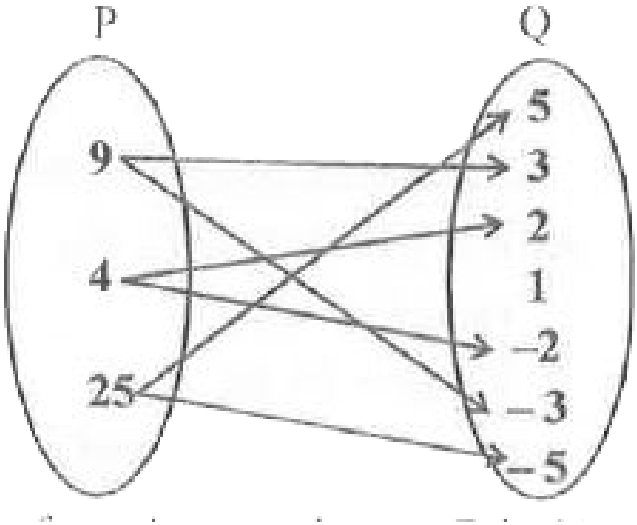
19. The figure shows a relation between the sets P and Q



write this relative (I) in set - builder form

(ii) in roster form

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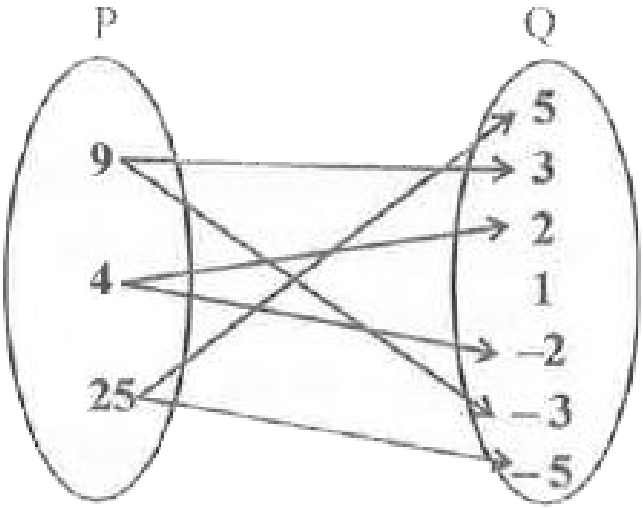
20. The figure shows a relation between the sets P and Q



write its domain and range

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21. The set A contains 3 elements and the number of relation from A to another set B is 64.

find the number of elements in B .

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22. Let $A = \{1, 2, 3, \ldots\ldots 14\}$ R is a relation on A defined by $R = \{(x, y), 3x - y = 0, x, y \in A\}$

write R in tabular form

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23. Let $A = \{1, 2, 3, \ldots\ldots 14\}$ R is a relation on A defined by $R = \{(x, y), 3x - y = 0, x, y \in A\}$

find the domain , and range or R .

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24. consider the relation $R = \{(x, 2x - 1) \mid x \in A\}$, where $A = \{1, -1, 3\}$

write R in roster form

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25. consider the relation $R = \{(x, 2x - 1) \mid x \in A\}$, where $A = \{1, -1, 3\}$

write the range of R .

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26. Determine the domain and range of the relation R where $R = \{(x, x^3) : x$ is a prime number less than 15 $\}$.

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27. Let A ={1,2,3,4,5,6} . Define a relation R from A to A by $R = \{(x, y) : y = x + 1\}$

Depict this relation using an arrow diagram .

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28. Let A ={1,2,3,4,5,6} . Define a relation R from A to A by

$R = \{(x, y) : y = x + 1\}$

write down the domain , and range of R .

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29. Let A ={ 1,2,3,4,5} and R be the relation on A defined by

$R = \{(a, b\} : b = a^2\}$

write R in roster form

View Text Solution

30. Let A ={ 1,2,3,4,5} and R be the relation on A defined by

$R = \{(a, b\} : b = a^2\}$

find the range of R.

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31. The cartesian product $P \times P$ has 9 elements among which are found $(-a, 0)$ and $(0, a)$

A relation from P to P is defined as R $= \{(xy) : x + y = 0\}$

How many relations are possible from P to P ?

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32. The cartesian product $P \times P$ has 9 elements among which are found $(-a, 0)$ and $(0, a)$

A relation from P to P is defined as R $= \{(xy) : x + y = 0\}$

How many relations are possible from P to P ?

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33. The cartesian product $P \times P$ has 9 elements among which are found $(-a, 0)$ and $(0, a)$

A relation from P to P is defined as R $= \{(xy) : x + y = 0\}$

How many relations are possible from P to P ?

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34. A ={ 1,2,3,5} and B={ 4,6,9 } . Define a relation R from 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

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35. The figure shows a relationship between the sets P and Q . Write the relation

roster form

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36. The figure shows a relationship between the sets P and Q . Write the relation

in set- builder form

Watch Video Solution

37. The figure shows a relationship between the sets P and Q . Write the relation

what is its domain and range ?

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38. Write the relation $R = \{(x, x^3)x$ is a prime number less than 10 } in roster form

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39. Examine each of the following relations given below and state in each case giving reasons whether it is a function ir not ?

$R = \{(2, 1,), (3, 1), (4, 2)\}$

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40. Examine each of the following relations given below and state in each case giving reasons whether it is a function ir not ?

$R = \{(2, 2), (2, 4), (3, 3), (4, 4)\}$

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41. Examine each of the following relations given below and state in each case giving reasons whether it is a function ir not ?

$R = \{(1, 2, (2, 3), (3, 4), (4, 5), (5, 6), (6, 7)\}$

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42. Given $A = \{3, 4, 5\}b = \{2\}$

the number of relation from A to B is _____

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43. Given

$A = \{3, 4, 5\}$. det er min $ethedoma \in$ and $ran \geq ofrelationRiadef \in e$

R= {(x,y)| y=x-2}`

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44. Given $A = \{3, 4, 5\} b = \{2\}$

Represent the above relation R using an arrow diagam

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45. Given $A = \{3, 4, 5\} b = \{2\}$

the number of relation from A to B is _____

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46. Let N be the set of natural numbers and the relation R be defined on N such that $R = \{(x, y) : y = 2x, x, y \in N\}$.

what is the domain codomain and range of R ? Is this relation a functions ?

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47. Consider the real function f(x) =1 -2x

find f(-1) and f(2)

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48. Consider the real function f(x) =1 -2x

find x if f(x) =-1

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49. consider the real function of $f(x) = \frac{x^2 + 2x + 3}{x^2 - 8x + 12}$

find the value of x if f (x) =1

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50. consider the real function of $f(x) = \frac{x^2 + 2x + 3}{x^2 - 8x + 12}$

find the domain of f .

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

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52. 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.

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53. Consider the real function $f(x) = \frac{x+2}{x-2}$

find the domain and range of the function

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54. Consider the real function $f(x) = \frac{x+2}{x-2}$

prove that f(x) f(-x) +f(0) =0

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55. find the domain and range of the real function $f(x) = \sqrt{9-x^2}$

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56. R is the set of real number . Define the function $f: R \to R$ by $f(x) = x^2 + 3$

find f(-1) and f(2)

Watch Video Solution

57. R is the set of real number . Define the function $f: R \to R$ by

$f(x) = x^2 + 3$

Draw the graph of f(x)

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58. Draw the graph of the function f :R $\to$ R defined by

$f(x) = x^3, x \in R$

find its domain and range

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59. The function f is defined by

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

draw the graph of f(x) .

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60. Draw the graph of the function $f(x) = \begin{cases} 1 + x & -1 \leq x \leq 0 \\ 1 - x & 0 < x \leq 1 \end{cases}$

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61. Find the range of the function

$$f(x) = [2x], \frac{1}{3} \leq x \leq \frac{8}{3}$$

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62. $f(x) = x^2 + 1, 0 \leq x \leq 2$

find the range of the function f.

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63. $f(x) = x^2 + 1, 0 \leq x \leq 2$

find the range of the function f.

Watch Video Solution

64. $f(x) = x^2 + 1, 0 \leq x \leq 2$

find the range of the function f.

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65. Write the equations for the x-and y-axes.

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66. consider the functions

$$f(x) = \sqrt{x-2}, g(x) = \frac{x+1}{x^2-2x+1}$$

domain of f

Watch Video Solution

67. consider the functions

$$f(x) = \sqrt{x-2}, g(x) = \frac{x+1}{x^2-2x+1}$$

domain of g

Watch Video Solution

68. consider the functions

$$f(x) = \sqrt{x-2}, g(x) = \frac{x+1}{x^2-2x+1}$$

$(fg)(x)$

Watch Video Solution

69. consider the functions

$f(x) = \sqrt{x-2}, g(x) = \frac{x+1}{x^2-2x+1}$

$(fg)(x)$

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70. Let R be the set of reals . Define a function $F: R \to R$ by f (x) $= 2x^2 - 1$

find $\frac{f(-1)+f(1)}{2}$

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71. Let R be the set of reals . Define a function $F: R \to R$ by f (x) $= 2x^2 - 1$

find f(f(x))

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72. Let R be the set of reals . Define a function $F: R \to R$ by f (x) $= 2x^2 - 1$

draw the graph of f (x).

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73. find the domain and range of the following real functions

$f(x) = -|X|$

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74. The function 't' which maps temperature in degree Celsius into temperature in degree Fahrenheit is defined by $t(C) = \frac{9C}{5} + 32$

Find (i) t(0) (ii) t(28) (iii) t(-10) (iv) The value of C, when t(C)=212.

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76. The function 't' which maps temperature in degree Celsius into temperature in degree Fahrenheit is defined by $t(C) = \frac{9C}{5} + 32$

Find (i) t(0) (ii) t(28) (iii) t(-10) (iv) The value of C, when t(C)=212.

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77. Find the range of each of the following functions

f(x) =2-3x , $x \in R, x > 0$

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78. Find the range of each of the following functions

$f(x) = x^2 + 2,$ x is real number

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79. Find the range of each of the following functions

f (x) = x,x is real number

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

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

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

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81. If $f(x) = x^2$ find $\frac{f(1.1) - f(1)}{(1.1 - 1)}$

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82. find the domain of the function $f(x) = \frac{x^2 + 2x + 1}{x^2 - 8x + 12}$

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83. find the domain and the range of the real functions f defined by $f(x) = |x - 1|$

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84. Let $\left\{\left(x, \frac{x^2}{1 + x^2}\right) : x \in R\right\}$ be a function from R into R Determine the range of f .

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

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86. Let f be a subset of $Z \times Z$ defined by f ={ (ab ,a+b) : a,b in Z }` is f a function from z to Z ? Jusity your answer

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87. Let R be relation from N into N defined by R $= \{(a, b) : a, b \in N, a = b^2\}$ are the following true ? Justify your answer in each case .

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

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88. Let R be relation from N into N defined by R $= \{(a, b) : a, b \in N, a = b^2\}$ are the following true ? Justify your answer in each case for all a,b. (a,b) $\in R$ implies (b,a) $\in R$

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89. Let R be relation from N into N defined by R $= \{(a, b) : a, b \in N, a = b^2\}$ are the following true ? Justify your answer in each case .

(a, b) and $(b, c) \in R$ for all $a, b, c, \in N$ implies (a,c) $\in$ R

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90. Let $A = \{1, 2, 3, 4), B = \{1, 5, 9, 11, 15, 16\}$ and $f = \{(1, 5), (2, 9), (3, 1), (4,$ are the following true

f is a relation from A to B

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Watch Video Solution

91. Let

$A = \{1, 2, 3, 4), B = \{1, 5, 9, 11, 15, 16\}$ and $f = \{(1, 5), (2, 9), (3, 1), (4,$

are the following true

f is a function from A to B

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Exercise

1. $A = \{1, 2, 3, 4\}, B = \{3, 4, 5\}$ then $(A \times B) \cap (B \times A) =$

A. {(3,3),(3,4),(4,3),(4,4)}

B. {(2,3) ,(2,4) , (3,3),(3,4) ,(4,3)(4,4)}

C. {(2,3),(3,3),(4,3)}

D. {(3,3),(4,4)}

Answer: A

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2. A = { set of all multiples of 3 less than 20 }

B = { set of the multiples of 2 less than 18 }

$n((A \times B) \cap (B \times A))$ is

A. 9

B. 2

C. 16

D. 25

Answer: B

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3. A is the set of all prime number less than 10. then number of relations in A is

A. 14464

B. 28928

C. 65536

D. 115712

Answer: C

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4. Let X ={ 1,2,3,4,5} and Y= {1,3,5,7,9} which of the following is not a relation from X to Y ?

A. R_1={(1,3),(4,5),(5,7)}

B. R_2 = {(1,1),(2,1),(3,3) ,(4,3),(5,5))}

C. R_3 ={(1,1).(1,3),(3,5),(3,7),(5,7) }

D. R_4= {(1,3),(2,5),(2,4),(7,9)}

Answer: D

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5. R is a relation on the set $A = \{1, 2, 3, 4, 6, 7, 8, 9\}$ given by xRy and y=3x `, then R=

A. $\{(3, 1), (6, 2), (8, 2), (9, 3)\}$

B. $\{(13, 1), (6, 2), (9, 3)\}$

C. $\{(3, 1), (2, 6)(3, 9)\}$

D. none of these

Answer: D

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6. Let A and B be two sets having m and n elements respectively . Then total number of functions from A to B is

A. mn

B. 2^{mn}

C. m^n

D. n^m

Answer: D

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7. Number of mappings from an empty set to a non empty set with n elements

A. n

B. 2^n

C. 1

D. n^2

Answer: C

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8. If N is the set of alll natural numbers then which of the following is true

A. $f(x) = 3x - 2$ does not map N to N

B. $f(x) = x^2 + 1$ does not map N to N

C. $x \to x^2 - 3x + 1$ does not map N to N

D. $x \to \frac{x(x+1)}{2}$ does not map N to N

Answer: C

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9. $g = \{(1, 1), (2, 3), (3, 5), (4, 7)\}$ is a function such that $g(x) = ax + b$ then a+ b

A. 2

B. 1

C. 1

D. -2

Answer: B

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10. Let $f = \{(1, 1), (2, 3), (0, -1), (-1, -3)\}$ be a relation from Z to Z defined by f(x) = ax-b then (a,b) =

A. $(1, -2)$

B. $(2, -1)$

C. (2,1)

D. $(1, 2)$

Answer: C

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11. The domain of the function $f(x) = \sqrt{x^2 + 1}$ is

A. R

B. $[0, \infty]$

C. $(0, \infty)$

D. Z

Answer: A

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12. The domain of $f(x) = \sqrt{16 - x^2}$ is

A. $(-4, 4)$

B. $[-4, 4]$

C. $x \leq 4$

D. $x \geq 4$

Answer: B

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13. The range of $f(x) = x^2 + 1$ is

A. $(0, \infty)$

B. $(1, \infty)$

C. $[1, \infty)$

D. $[2, \infty]$

Answer: C

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14. The domain of $f(x) = \frac{1}{x^2+1}$ is

A. $R - \{0\}$

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

C. R

D. N

Answer: C

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15. The domain of $\sqrt{\frac{1}{1-x^2}}$ is

A. $(-1, 1)$

B. $[-1, 1]$

C. $(1, \infty)$

D. $(-\infty, -1)$

Answer: A

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16. The range of $f(x) = \frac{x-3}{3-x}, x \neq 3$ is

A. {1}

B. {-1}

C. {1,2}

D. {1,-1}

Answer: B

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17. F : $R \to R$ defined by $f(x) = \frac{1}{2x^2+5}$ the range of F is

A. A. $(5, \infty)$

B. B. $\left[0, \frac{1}{5}\right]$

C. C. $\left[\frac{1}{5}, 5\right]$

D. D. none of these

Answer: D

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18. The domain of f(x) $= \frac{1}{\sqrt{|X| - x}}$ is

A. The set of all non zero integers

B. The set of all negative real numbers

C. The set of all positive real number

D. the set of all rational numbers

Answer: B

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19. The domain of $f(x) = \frac{\sqrt{17 - 15x - 2x^2}}{x + 3}$

is

A. $\left[\frac{-17}{2}, 1\right]$

B. $\left[\frac{-17}{2}, 1\right] - \{-3\}$

C. $(-3, 1]$

D. $(-\infty, 0)$

Answer: C

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20. If for a function f : $R \to Rf(x + y) = F(x) + f(y)$ for all x and y

then f(0) is

A. t

B. 0

C. any real number

D. -1

Answer: B

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21. if $f(x) = \frac{x-1}{x+1}$ the f(2x) is

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

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

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

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

Answer: B

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22. Let f(x) = |x-1| , then which of the following is true

A. $f\left(x^2\right) = [f(x)]^2$

B. $f(|x|) = |f(x)|$

C. $f(x+y) = f(x) + f(y)$

D. none of these

Answer: D

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23. The domain of the function

$f(x) = \frac{1}{\sqrt{(a-x)(x-b)}, b > a}$ is

A. $a \leq x < b$

B. $a \leq x \leq b$

C. $a < x \leq b$

D. $a < x < b$

Answer: D

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24. the domain of $y = \frac{1}{\sqrt{|x| - x}}$ is

A. $[0, \infty)$

B. $(-\infty, 0)$

C. $(-\infty, 0]$

D. $[1, \infty)$

Answer: B

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

A. $(-\infty, \infty)$

B. $[-2, \infty)$

C. $(-2, 3)$

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

Answer: B

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Questions From Competitive Exams

1. If $x \neq 1$ and $f(x) = \dfrac{x+1}{x-1}$ is a real function then fff (2) is

A. 1

B. 2

C. 3

D. 4

Answer: C

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2. If A $=\{x : x^2 - 5x + 6 = 0\}$, $B = \{2, 4\}$, C={4,5 } , then $A \times (B \cap C)$ is

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

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

C. $\{(2, 4), (3, 4), (4, 4)\}$

D. `{(2,2),(3,3) ,(4,4) ,(5,5)}

Answer: A

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3. Let $f\left(x+\frac{1}{x}\right)=x^2+\frac{1}{x^2}, x \neq 0,$ then $f(x)$=?

A. x^2

B. x^2-1

C. x^2-2

D. x^2+1

Answer: C

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4. If two sets A and B are having 99 elements in common to each of the sets $A \times B$ and $B \times A$ are

A. 2^{99}

B. 99^2

C. 18

D. 9

Answer: B

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5. The function f Satisfies the functional equation $3f(x) + 2f\left(\frac{x+59}{x-1}\right) = 10x + 30$ for all real $x \neq 1$. The value of f (7) is

A. 8

B. 4

C. -8

D. 11

Answer: B

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6. If $n(A) = 4, n(B) = 3, n(A \times B \times C) = 24$ then , n(C) =

A. 288

B. 1

C. 12

D. 2

Answer: D

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7. IF [x] denotes the greatest integer $\leq$ x then

$$\left[\frac{2}{3}\right] + \left[\frac{2}{3} + \frac{1}{99}\right] + \left[\frac{2}{3} + \frac{2}{99}\right] + \ldots\ldots\ldots \left[\frac{2}{3} + \frac{98}{99}\right] =$$

A. 99

B. 98

C. 66

D. 65

Answer: C

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8. suppose the number of elements in set A is P , the number of elements in set B is q and the number of elements in A $\times$ B is 7 . Then $p^2 + q^2$ =

A. 42

B. 49

C. 50

D. 51

Answer: C

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9. Let Z denote the set of all integers and $A = \{(a, b) : a^2 + 3b^2 = 28, a, b \in Z\}$ and $B = \{(a, b) : a > b, \in Z\}$. Then the number of elements in $A \cap B$ is

A. 2

B. 3

C. 4

D. 6

Answer: D

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10. IF f(x) $= 2x^2 + bx + c$ and f(0) =3 and f (2) =1, then f(1) is equal to

A. 1

B. 2

C. 0

D. -2

Answer: C

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11. if f(x) =ax +b and g(x) = cx +d ,$then f[g(x)] - g[f(x)]$is equivalent to

A. $f(a) - g(c)$

B. $f(c) + g(a)$

C. $f(d) + g(b)$

D. $f(d) - g(b)$

Answer: D

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12. If f (x) satisfies the relation $2f(x) + f(1-x) = x^2$ for all real x, then $f(x)$ is

A. $\frac{x^2 + 2x - 1}{6}$

B. $\frac{x^2 + 2x - 1}{3}$

C. $\frac{x^2 + 4x - 1}{3}$

D. $\frac{x^2 - 3x + 1}{6}$

Answer: B

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13. The range of the function

$f(x) = \frac{x^2 - x + 1}{x^2 + x + 1}$ where $x \in R$, is

A. $(-\infty, 3]$

B. $(-\infty, \infty)$

C. $[3, \infty)$

D. $\left[\frac{1}{3}, 3\right]$

Answer: D

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14. If a function f satisfies $f(f(x)) = x + 1$ for all real values of x and if f(0) = $\frac{1}{2}$ then $f(1)$ is equal to

A. $\frac{1}{2}$

B. 1

C. $\frac{3}{2}$

D. 2

Answer: C

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15. If f is a real valued function such that $f(x+y)=f(x)+f(y)$ and $f(1)=5$, then the value of f(100) is

A. 200

B. 300

C. 350

D. 500

Answer: D

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16. Let $f(x)=\frac{\alpha x^2}{x+1}, x \neq -1$ the value of α for which $f(a)=a, (a \neq 0)$ is

A. $1-\frac{1}{a}$

B. $\frac{1}{a}$

C. $1+\frac{1}{a}$

D. $\frac{1}{a} - 1$

Answer: C

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17. Let $A = \{x, y, z\}$ and $b = \{a, b, c, d\}$. which one of the following is not relation from A to B ?

A. $\{(x, a), (x, c)\}$

B. $\{(y, c), (y, d)\}$

C. $\{(z, a), (z, d)\}$

D. $\{(z, b), (y, b), (a, d)\}$

Answer: D

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18. The domain of the function f (x) $= \frac{1}{\sqrt{9-x^2}}$ is

A. $-3 \leq x \leq 3$

B. $-3 < x < 3$

C. $-9 \leq x \leq 9$

D. $-9 < x < 9$

Answer: B

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19. If n (A) =5 and n(B) =7 , then the number of relations on $A \times B$ is

A. 2^{35}

B. 2^{49}

C. 2^{25}

D. $2^{35 \times 35}$

Answer: A

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20. Let $\phi(x) = \frac{b(x-a)}{b-a} + \frac{a(x-b)}{a-b}$, where $x \in R$ and a and b are fixed real numbers with $a \neq b$ then $\phi(a+b)$ is equal to

A. $\phi(ab)$

B. $\phi(-ab)$

C. $\phi(a) + \phi(b)$

D. $\phi(a-b)$

Answer: C

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21. The range of the functions $f(x) = \frac{x^2+8}{x^2+4} x \in R$ is

A. $\left[-1, \frac{3}{2}\right]$

B. $(1, 2]$

C. $[1, 2]$

D. $\left[\frac{3}{2}, 2\right]$

Answer: B

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22. Let f (x) = [x] , where [x] denotes the greater integer less than or equal to x. if $a = \sqrt{2011^2 + 2012}$ then the value of f (a) is equal to

A. 2010

B. 2011

C. 2012

D. 2013

Answer: B

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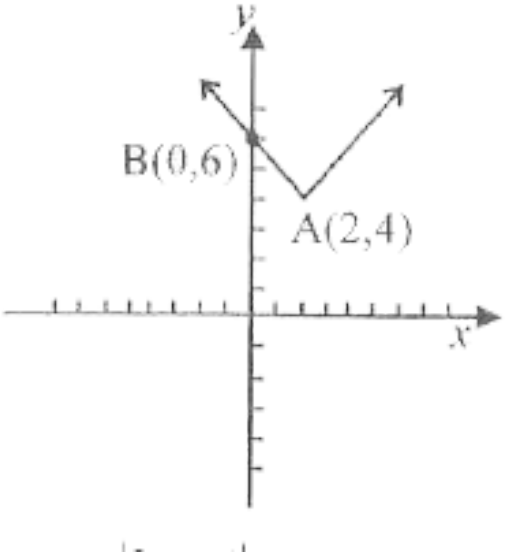
23. In the given figure the angle at A is $\frac{\pi}{2}$ then the graph represents the function



A. $y = |2x - 4| + 4$

B. $y = -|X| + 6$

C. $y = |4x - 6| + 2$

D. $y = |x - 2| + 4$

Answer: D

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24. The image of the interval $[-1, 3]$ under the mapping $f: R \to R$ given by $f(x) = 4x^3 - 12x$ is

A. $[8, 72]$

B. $[0, 72]$

C. $[-8, 72]$

D. $[0, 8]$

Answer: A

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25. the domain of the function

$f(x) = \dfrac{\log(x+3)}{x^2 + 3x + 2}$ is

A. $R - \{-1, -2\}$

B. $R - \{-1, -2.0\}$

C. $(-3, -1) \cup (-1, \infty)$

D. $(-3, \infty) - \{-1, -2\}$

Answer: D

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26. The number of function that can be defined from the set $A = \{a, b, c, d\}$ into the set $B = \{1, 2, 3\}$ is equal to

A. 12

B. 24

C. 64

D. 81

Answer: D

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27. The range of the function $f(x) = x^2 + 2x + 2$ is

A. $(1, \infty)$

B. $(2, \infty)$

C. $[1, \infty)$

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

Answer: C

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28. IF $f(x) = \dfrac{x+2}{3x-1}$, then $f(f(x))$ is

A. x

B. $-x$

C. $\dfrac{1}{x}$

D. $-\dfrac{1}{x}$

Answer: A

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29. The function f (x) $= \log\left(x + \sqrt{x^2 + 1}\right)$ is

A. an odd function

B. a periodic function

C. neither an even nor an odd function

D. an even function

Answer: A

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30. Domain of definitation of the function

$f(X) = \frac{3}{4 - x^2} + \log_{10}\left(x^3 - x\right)$ is

A. $(-1, 0) \cup (1, 2)$

B. $(1, 2) \cup (2, \infty)$

C. $(-1, 0) \cup (1, 2) \cup (2, \infty)$

D. $(1, 2)$

Answer: C

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31. If F $: R \to R$ satisfies $f(x + y) = f(x) + f(y)$ for all $x, y \in R$ and f (1) =7 , then $\sum_{r=1}^{n}$ f(R) is

A. $\frac{7(n+1)}{2}$

B. $(7n(n+1)$

C. $\frac{7n(n+1)}{2}$

D. $\frac{7n}{2}$

Answer: C

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32. The graph of the function $y = f(x)$ is symmetrical about the line x=2 then

A. $f(x) = f(-x)$

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

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

D. $f(x) = -f(-x)$

Answer: C

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33. A real valued function f (x) satisfies the functional equation f (x-y)= $f(x)f(y) - f(a-x)f(a+y)$ where a is a given constant and f (0) =1, f(2a -x) is equal to

A. $f(x)$

B. $-f(x)$

C. $f(-x)$

D. $f(a)+f(a-x)$

Answer: B

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