Multiple Choice Question   41 x 1 = 41

1) If the set A has m elements, B has n elements then the number of elements in A x B is _____.

   (a) m + n   (b) m + n + 1   (c) mn   (d) n^2

2) Let R be a relation from a set A to B, then _____.

   (a) R=A$\cup$B   (b) R =A$\cap$B   (c) R$\subset$A x B   (d) R $\subset$ B x A

3) If R is a relation from a finite set A having m elements to a finite set B having n elemen.ts, then the number of relations from A to B is _____.

   (a) 2^{mn} (b) 2^{mn-1} (c) 2mn   (d) m^n

4) Which one of the following is not a function

   (a) {(x, y) (:) x, y $\in$ R, x^2 = y}   (b) {(x, y) (:) x, y $\in$ R, y^2 = x}   (c) {(x, y) (:) x, y $\in$ R, x = y^3}
   (d) {(x, y) (:) x, y $\in$ R, y = x^3}

5) Let f(x) = Ix-1I then _____.

   (a) f(x^2) = [f(x)]^2 (b) f(x +y) = f(x) f(y)   (c) f(IxI) = I f(x) I   (d) none of these

6) If f(x) = log$\frac{1+x}{1-x}$ and g(x) = $\frac{3x+x^3}{1+3x^2}$ then f(g(x)) is equal to _____.

   (a) f(2x)   (b) $[f(x)]^2$ (c) 3f(x)   (d) - f(3x)

7) If $f(x) = \frac{2^x+2^{-x}}{2}$ then f(x+y) f(x-y)is equal to _____.

   (a) $\frac{1}{2}[f(2x) + f(2y)]$ (b) $\frac{1}{2}[f(2x) - f(2y)]$ (c) $\frac{1}{3}[f(2x) + f(2y)]$ (d) $\frac{1}{3}[f(2x) - f(2y)]$

8) If f(x) = $\frac{x+1}{x-1}$ is a real function,$\neq$ 1, then $f[f\{f(2)\}]$ is _____.

   (a) -1   (b) -3   (c) 3   (d) 4

9) If f: R$\to$ R be given by f(x) = $\frac{4^x}{4^x+2}$ for all x $\in$ R, then _____.

   (a) f(x) = f(1 + x)   (b) f(x) + f(1 + x) = 0   (c) f(x) + f(1 - x) = 1   (d) none of these

10) The domain of the function $f(x) = \sqrt{x-1} + \sqrt{3-x}$ is _____.

    (a) (1,∞)   (b) (∞ ,5)   (c) (1, 3)   (d) [1, 3]

11) Let A and B be two sets such that A x B consists of 6 elements. If three elements of A x B are (1, 4), (2, 6) and (3, 6), then _____.

    (a) (A X B) = (B X A)   (b) (A X B) *(B X A)   (c) A X B = {(1, 4), (1,6), (2, 4)}   (d) None of the above

12) Let A and B be two non-empty sets having n elements in common. Then, the number of elements common to A x Band B x A is _____.

    (a) 2n   (b) n   (c) n^2 (d) None of these

13) If n(A x B) = 45, then n(A) cannot be _____.

    (a) 15   (b) 17   (c) 5   (d) 9

14) 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)}

15) If A = {1,2, 3}, B = {3, 4}, C = {4, 5, 6}, then $(A \times B) \cap (B \times C)$ is equal to _____.

(a) {(1,4)}   (b) {(3,4)}   (c) {(I, 4), (3, 4)}   (d) None of these

16) Two finite sets A and B have m and n elements respectively. If the total number of relation from A to B is 64, then the possible values of m and n can be _____.

(a) 1 and 5   (b) 2 and 4   (c) 2 and 3   (d) 1 and 4

17) The relation on the set A = $\{x : |x| < 3, x \in Z\}$ is defined by R = $\{(x, y) : y = |x|, x \neq -1\}$. Then, the number of elements in the power set of R is _____.

(a) 32   (b) 16   (c) 8   (d) 64

18) The relation R defined on the set of natural numbers as {(a, b): a differs from b by 3},is given by _____.

(a) {(I, 4), (2, 5), (3, 6),... }   (b) {(4, 1), (5,2), (6,3),.... }   (c) {(I, 3), (2, 6), (3, 9),.... }

(d) None of the above

19) If a relation R is defined on the set Z of integers as follows $(a, b) \in R \Leftrightarrow a^2 + b^2 = 25$, then domain (R) is equal to _____.

(a) {3, 4, 5}   (b) {0 ,3, 4, 5}   (c) {0 ,± 3, ± 4, ± 5}   (d) None of these

20) The domain for which the functions defined by f(x) = 3x² - 1and g(x) = 3 + x are equal to _____.

(a) $\left\{-1, \frac{4}{3}\right\}$ (b) $\left\{-1, -\frac{4}{3}\right\}$ (c) $\left\{1, \frac{4}{3}\right\}$ (d) $\left\{1, -\frac{4}{3}\right\}$

21) Let f(x) = $\sqrt{1 + x^2}$, then _____.

(a) f(xy) = f(x) . f(y)   (b) $f(xy) \geq f(x) \cdot f(y)$ (c) $f(xy) \leq f(x) \cdot f(y)$ (d) None of these

22) Domain of $\sqrt{a^2 - x^2}(a > 0)$ is _____.

(a) (- a, a)   (b) [- a, a]   (c) [0, a]   (d) (- a, 0]

23) If f (x) = $\frac{1}{2 - \sin 3x}$, then range (f) is equal to _____.

(a) [- 1, 1]   (b) $\left[-\frac{1}{3}, \frac{1}{3}\right]$ (c) $\left[\frac{1}{3}, 1\right]$ (d) $\left[-1, \frac{-1}{3}\right]$

24) If f(x) = $\frac{4^x}{4^x + 2}$ then $f\left(\frac{1}{97}\right) + f\left(\frac{2}{97}\right) + \ldots + f\left(\frac{96}{97}\right)$ is equal to_____.

(a) 1   (b) 48   (c) -48   (d) -1

25) If f(xy) = f(x) f(y), then f(t) may be of the form _____.

(a) t +k   (b) ct + k   (c) t^k+c   (d) t^k

26) If x ≠ 1 and $f(x) = \frac{x+1}{x-1}$ is a real function, then f(f(f(2))) equals _____.

(a) 1   (b) 2   (c) 3   (d) 4

27) If two sets A and B are having 99 elements in common, then the number of elements common to each of the sets A x Band B x A are _____.

(a) 2^{99} (b) 99^2 (c) 100   (d) 18

28) If A = {1, 2, 5, 6} and B = {1, 2, 3}, then what is (A x B) n (B x A) equal to _____.

(a) {(1, 1), (2, 1), (6, 1), (3, 2)}   (b) {(1, 1), (1,2), (2, 1), (2, 2)}   (c) {(1, 1), (2, 2)}

(d) {(1, 1), (1,2), (2, 5), (2, 6)}

29) Let R = $\{x \mid x \in N, x$ is a multiple of 3 and $x \leq 100\}$ S = $\{x \mid x \in N, x$ is a multiple of 5 and $x \leqq 100\}$. What is the number of elements in $(R \times S) \cap (S \times R)$?

(a) 36   (b) 33   (c) 20   (d) 6

30) If A is a finite set having n elements, then the number of relations which can be defined in A is _____.

(a) 2^n (b) n^2 (c) 2^{n^2} (d) n^n

31) Let R be a relation in N defined by $R = \{(1+x, 1+x^2) : x \leq 5, x \in N\}$. Which of the following is false?

(a) R = {(2, 2), (3, 5), (4, 10), (5, 17), (6, 25)}   (b) Domain of R = {2, 3, 4, 5, 6}

(c) Range of R = {2,5, 10, 17, 26}   (d) None of the above

32) If f(x) = $\frac{1+x}{1-x}$ then $\frac{f(x) \cdot f(x^2)}{1+[f(x)]^2}$ is equal to _____.

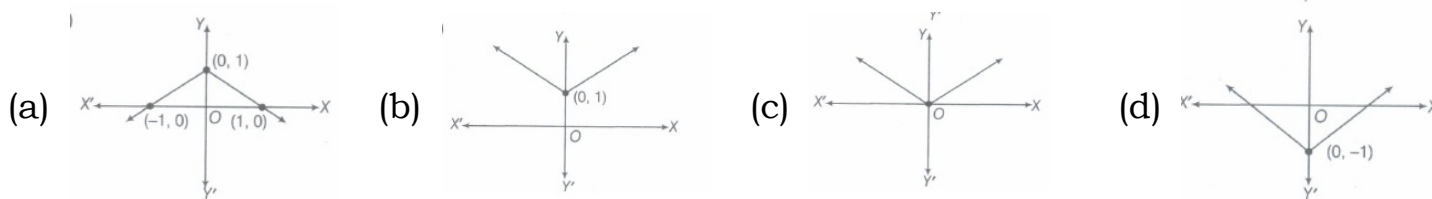(a) $\frac{1}{4}$ (b) $\frac{1}{6}$ (c) $\frac{1}{8}$ (d) $\frac{1}{2}$

33) Let f :R $\rightarrow$ R be such that f(x) = 2^x. Then, consider the following statements

I. Range of $f = (0, \infty)$

II. $\{x : f(x) = 1\} = \{0\}$

III. $f(x+y) = f(x) \cdot f(y)$

Which of the above statements is/are correct?

(a) Only I   (b) I and II   (c) II and III   (d) All of these

34) The graph of the function defined by $f(x) = \begin{cases} 1-x, & x < 0 \\ 1, & x = 0 \\ 1+x, & x > 0 \end{cases}$ is _____.
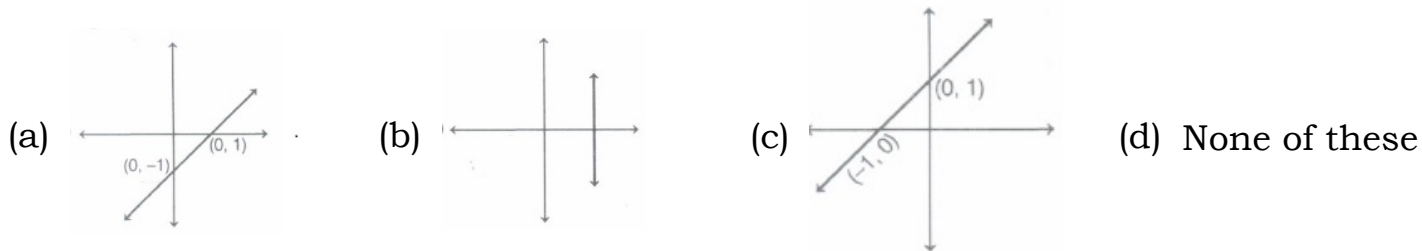
(a)   (b)   (c)   (d)

35) If f(x) = cos (log x), $f(x)f(y) - \frac{1}{2}\left[f\left(\frac{x}{y}\right) + f(xy)\right]$ then has the value _____.

(a) -1   (b) $\frac{1}{2}$ (c) -2   (d) 0

36) 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 _____.
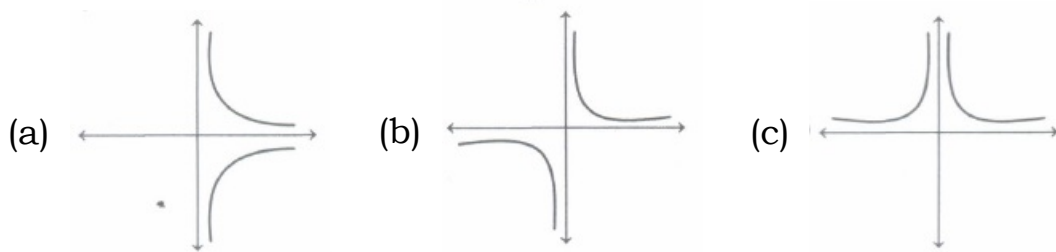
(a) $\frac{1}{2}$ (b) 1   (c) $\frac{3}{2}$ (d) 2
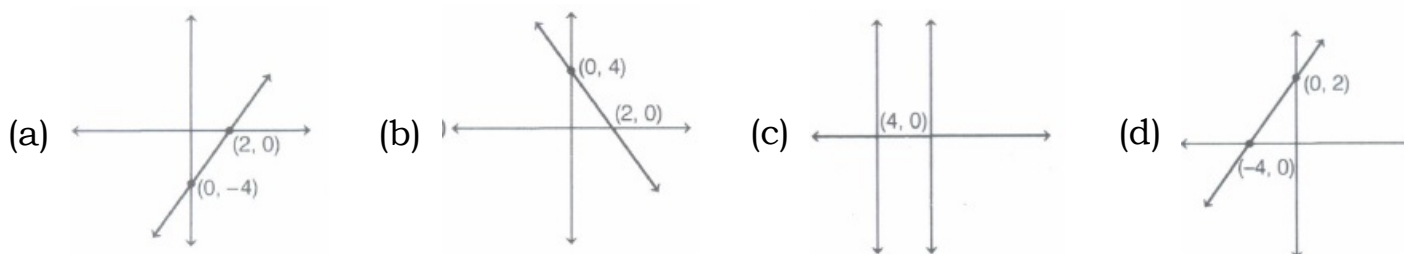
37) The graph of the function, f(x) = x-1 is _____.

(a)   (b)   (c)   (d) None of these

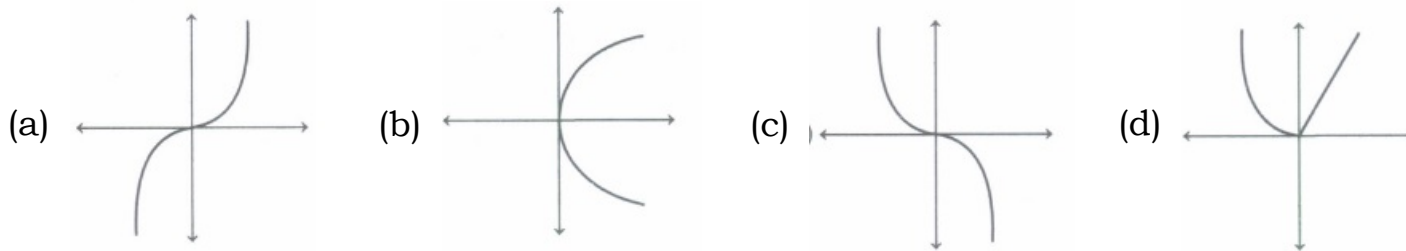**38)** The graph of the function, f(x) = $\frac{1}{x^2}$ is _____.
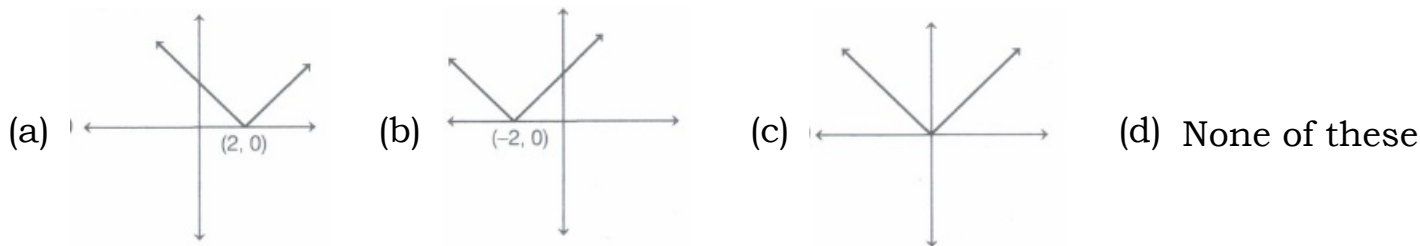
(a)   (b)   (c)   (d) None of these

39) The graph of the function, f(x) = 4 - 2x is _____.

(a)   (b)   (c)   (d)

40) The graph of the function, $f(x) = x^3$ is _____.

(a) ![graph a] (b) ![graph b] (c) ![graph c] (d) ![graph d]

41) The graph of the functions, $f(x) = |x - 2|$ is _____.

(a) ![graph] (2, 0)   (b) ![graph] (−2, 0)   (c) ![graph]   (d) None of these

2 Marks   266 x 2 = 532

42) Let $f(x)=x^2$ and $g(x)=2x+1$ be two real functions. Find $(f + g)(x)$, $(f -g)(x)$, $(fg)(x)$, $\left(\frac{f}{g}\right)(x)$

43) State whether each of the following statements are true or false. If the statements is false, then rewrite the given statement correctly. (i). If P = {m, n} and Q = {n, m}, then P x Q = {(m, n), (n, m)}.
(ii). If A and B are non-empty sets, then A x B is a non-empty set of ordered pairs (x,y) such that $x \in B$ and $y \in A$.
(iii). If A = {1, 2} and B = {3, 4}, then $A \times (B \cap \phi) = \phi$

44) If the set A has 3 elements and the set B ={3, 4, 5}, then find the number of elements in (A x B).

45) If G = {7, 8} and H = {5, 4, 2}, find G x H and H x G.

46) If A = {−1, 1}, find A × A × A.

47) Let A = {1, 2, 3, 4, 6}. Let R be the relation on A defined by {(a, b): a , b ∈A, b is exactly divisible by a}.
(i) Write R in roster form
(ii) Find the domain of R
(iii) Find the range of R

48) Write the relation R = {(x, x³): x is a prime number less than 10} in roster form.

49) If (x + 1, y − 2) = (3,1), find the values of x and y.

50) If P = {a, b, c} and Q = {r}, form the sets P × Q and Q × P. Are these two products equal?

51) If P = {1, 2}, form the set P × P × P.

52) If R is the set of all real numbers, what do the cartesian products R x R and R x R x R represent?

53) If A x B ={(p, q),(p, r), (m, q), (m, r)}, find A and B.

54) If A x B = {(a, x),(a , y), (b, x), (b, y)}. Find A and B.

55) The Fig shows a relation between the sets P and Q. Write this relation (i) in set-builder form, (ii) in roster form. What is its domain and range?

56) Let A = {1, 2} and B = {3, 4}. Find the number of relations from A to B.

57) 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 ∈ N}.
What is the domain, codomain and range of R? Is this relation a function?

58) Let N be the set of natural numbers. Define a real valued function $f : \mathbf{N} \to \mathbf{N}$ by $f(x) = 2x + 1$.
Using this definition, complete the table given below.

x	1	2	3	4	5	6	7
y	f (1) = ...	f (2) = ...	f (3) = ...	f (4) = ...	f (5) = ...	f (6) = ...	f (7) = ...

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

60) A function f is defined by f(x) = 2x − 5. Write down the values of (i) f (0), (ii) f (7), (iii) f (−3).

61) Let f = {(1,1), (2,3), (0, −1), (−1, −3)} be a linear function from Z into Z. Find f(x).

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

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

64) Express R = $\{(a,b) : 2a + b = 5; a, b \in w\}$ as the set of ordered pairs (in roster form).

65) Find the values of a and b, if (2a-5,4)=(5,b+6)

66) Find the values of a and b, if (a-3,b+7)=(3,7)

67) Which of the following relations are functions?
$\{(3, 3), (4, 2), (5, 1), (6, 0), (7, 7)\}$

68) If n(A) = m and n(B) = n, then find the total number of non-empty relations that can be defined from A to B.

69) Which of the following relations are functions?
$\{(2, 0), (4, 8), (2, 1), (3, 6)\}$

70) Find the cartesian product of three sets A = {1,2}, B = {3,4} and C = { x : x ∈ N and 4 ≤ x ≤ 6}.

71) If A x B = {(1,x),(1,y),(1,z),(1,w)}, then find A and B.

72) If A x B = {(a, 1),(a, 5), (a,2),(b,2),(b, 5),(b, 1)}, then find A ,B and B x A.

73) If the set A has 3 elements and set B = {3, 4, 5}, then find the number of elements in (A x B).

74) Let A = {a,b,c} and B={x: x∈ N, x is a prime number less than 5}. Find A x B ans B x A.
Show that A x B ≠ B x A.

75) If A = {a,b} and B = {2,3}, then find the number of relations from A to B.
Number of relations from A to B = $2^{n(A)\times n(B)} = 2^{n(A\times B)}$

76) If n(A) = 3 and B = {2,3,4,6,7,8}, then find the number of relations from A to B.

77) If A = {1,2}, then find A x A x A

78) Find x and y, if (x+6, y-2)=(0,6)

79) If A = {a,b}, B = {2, 3, 5, 6, 7} and C = {5,6,7,8,9}, then find A x $(B \cap C$).

80) Find x and y, if (x+2, 4)=(5, 2x+y)

81) If x, y ∈ $\{1, 2, 3, 4\}$ then check whether f_1, f_2 and f_3 are functions or not where
$f_1 = \{(x, y) : y = x + 1\}$
$f_2 = \{(x, y) : x + y = 5\}$
and $f_3 = \{(x, y) : x + y > 4\}$. Also, find the range in the case of a function.

82) If A = {-1,1}, then find A x A x A.

83) If A={a,b,c} and B= {r,s}, then find A x B

84) If A={a,b,c} and B= {r,s}, then find B x A

85) A relation R is defined from a set A = {2,3,4,5} to a set B = {3,6,7,10} as follows $(x, y) \in R \Rightarrow x$ divides y. Express R as a set of ordered pairs and determine the domain and range of R.

86) If two functions are defined as $f(x) = \frac{1}{(x-2)}, x \neq 2$ and $g(x) = (x - 2)^2$, then find f + g.

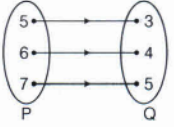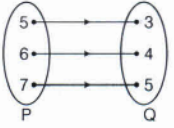**87)** If two functions are defined as $f(x) = \frac{1}{(x-2)}, x \neq 2$ and $g(x) = (x - 2)^2$ then find f - g.

88) If two functions are defined as $f(x) = \frac{1}{(x-2)}, x \neq 2$ and $g(x) = (x-2)^2$ then fg

89) If two functions are defined as $f(x) = \frac{1}{(x-2)}, x \neq 2$ and $g(x) = (x-2)^2$ then find $\frac{f}{g}$

90) If $A \times B = \{(a,x),(a,y),(b,x),(b,y)\}$, then find A and B

91) If A = {1,2} and B= {3,4,5}. Then, write down cartesian product A x B.

92) Let f and g be real functions defines by $f(x) = \sqrt{x+2}$ and g, then $g(x) = \sqrt{4-x^2}$ find the following function: $f + g$

93) Let f and g be real functions defines by $f(x) = \sqrt{x+2}$ and g, then $g(x) = \sqrt{4-x^2}$ find the following function: $f - g$

94) Let f and g be real functions defines by $f(x) = \sqrt{x+2}$ and g, then $g(x) = \sqrt{4-x^2}$ find the following function: f . g

95) Let f and g be real functions defines by $f(x) = \sqrt{x+2}$ and g, then $g(x) = \sqrt{4-x^2}$ find the following function: $\frac{f}{g}$

96) If A x B = {a,1), (b,3), (a,3), (b,1), (a,2), (b,2)}. Then, find A and B.

97) If the set A has 3 elements and set B has 4 elements, then find the number of elements in A x B.

98) A and B are two elements in such a way that A x B contains 6 elements. If three elements of A x B are (1,3), (2,5) and (3,3), find A, B and remaining elements of A x B.

99) If A = {9,10,11,12,13} and $f : A \rightarrow N$ be defined by f(n) = the highest prime factor of n, then find the range of f.

100) If f(x) = [x], then find (3f) (x).

101) Find the range of each of the following function. f(x) = x, x is a real number.

102) If A={a,b} and B={c,d} and C={d,c,e}, then find $A \times \{B \cup C\}$

103) Let $A = \{-2, -1, 0, 1, 2\}$ and $f : A \longrightarrow Z$ given by $f(x) = x^2 - 2x - 3$ then find the range of f

104) Let $A = \{-2, -1, 0, 1, 2\}$ and $f : A \longrightarrow Z$ given by $f(x) = x^2 - 2x - 3$ then find the pre-image of 6, -3, 5.

105) Given A = {-1, 0, 2, 5, 6,11}, B = {- 2, -1. 0,18,28, 108} }and $f(x) = x^2 - x - 2$. Is f(A)=B? Find f(A).

106) f = (1,1),(2,3),(0,-1),(-1,-3) be a function describe by the formula f(x) = ax+b for some integers a, b. Determine a, b.

107) If U = {1,2,3,4} and R = {(x,y) : y > x for all, x, $y \in U$ }, then find domain and range of R.

108) Determine the domain and range of the relation R= $\{(x, y) : x \in N, y \in N \text{ and } x + y = 10\}$

109) Determine the domain and range of the relation R= $\{(a, b) : a \in N, a < 5, b = 4\}$

110) Find the domain and range of the relation R = {(x, y) : x + y = 8; x, $y \in N$ }

111) The cartesian product P x P has 16 elements among which are found (a, 1) and (b, 2). Find the set P and the remaining elements of P x P.

112) Let $A = \{-2, \frac{1}{2}\}$ and $B = \{7, \frac{-1}{2}\}$, $f : A \rightarrow B$ defined by $f(x) = 2x^2 - 1$ and $g : A \rightarrow B$ defined by $g(x) = 1 - 3x$. Find whether f = g or not.

113) $f : R - \{3\} \rightarrow R$ be defined by $f(x) = \frac{x^2-9}{x-3}$ and $g : R \rightarrow R$ be defined by $g(x) = x + 3$. Find whether f = g or not.

114) Let $f : [2, \infty] \rightarrow R$ and $g : [-2, \infty] \rightarrow R$ be two real functions defined by $f(x) = \sqrt{x-2}$ and $g(x) = \sqrt{x+2}$. Find $f + g$ and $f - g$

115) The cartesian product A× B has 9 elements among which are found (-1,0) and (0,1). Find the set A and the remaining element of A × A.

116) If N = {1, 2, 3}, then find the relation R = {(x, y) : $x \in N, y \in N$ and 2x + y = 10} in N x N. Also, find its domain and range.

117) What are the sum and difference of identity function and the reciprocal function?

118) If P= {1,4} then find P x P x P

119) Find the inverse relation (R^{-1}) in each of the following cases R = {(1,2),(1,3),(2,3),(3,2),(5,6)}

120) Find the inverse relation (R^{-1}) in each of the following cases R= {(x,y) : x, y $\in$ N, x + 2y = 8}

121) Find the inverse relation (R^{-1}) in each of the following cases R is a relation from {11,12,13} to {8,10,12} defined by y = x-3

122) Which of the following are functions, if X = {a,b,c,d} and Y = {1, 2, 3, 4, 5}?
f_1 = {(a,1),(b,1),(c,3),(d,4)}

123) Let P and Q be two sets such that n(P) = 3 and n(Q) = 4. If (r, 4), (g, 1), (w,3) and (r,9) are in P x Q, then find P and Q, where r, g, w are where distinct elements. Also, write the remaining elements of P x Q.

124) Let f(x)=x^2 and g(x)=2x+1 be two real functions.Find (f –g) (x)

125) Let f(x)=x^2 and g(x)=2x+1 be two real functions.Find (fg) (x)

126) Let f(x)=x^2 and g(x)=2x+1 be two real functions.Find $\left(\frac{f}{g}\right)(x)$

127) Write the range of $y = \frac{|x-1|}{x-1}$.

128) If A= {1,2,3}, B={1,2,3,4}, C= {5,6} and D={5,6,7,8}, then verify that $(A \times C) \subset (B \times D)$

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

130) Find the domain of the function $\frac{1}{\sqrt{x-2}}$

131) Find the domain of the function $\sqrt{4-x^2}$

132) Find the values of x for which the function $f(x) = 3x^2 - 1$ and g(x) = 3 + x are equal.

133) If $f(x) = x^2 + 2x + 3,$ then find f(1), f(2) and f(3).

134) If $f(1+x) = x^2 + 1,$ then find f (2-h).

135) Let A be the set of first 10 natural numbers and let R be a relation on A defined by $(x, y) \in R \Leftrightarrow x + 2y = 10$ i.e R = $\{(x, y) : x \in A, y \in A \ and \ x + 2y = 10\}$. Express R and R^{-1} as sets of ordered pair. Also, determine
(i) domain of R and R^{-1}
(ii)Range of R and R^{-1}

136) If A = {1,2} and B= {3,4,5}. Then, write down the relation $R : A \to B$ such that (a+b) is an even number.

137) Let A and B be two sets such that n(A)=5 and n(B) =2. If a,b,c,d,e are distinct and (a,2),(b,3),(c,2),(d,3), (e,2) are elements of A x B, find A and B.

138) Find the domain for which the functions $f(x) = 2x^2 - 1$ and $g(x) = 1 - 3x$ are equal

139) Which of the following are functions, if X = {a,b,c,d} and Y = {1, 2, 3, 4, 5}?
f_2 = {(a,1),(b,2),(c,4),(a,2),(d,5)}

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

141) If $y = f(x) = \frac{1-x}{1+x},$ then show that x = f(y).

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

143) If A={1,4}, B= {2,3,6} and C= {2,3,7}, then verify that
$A \times (B \cup C) = (A \times B) \cup (A \times C)$

144) If A={x,y,z} and B=[1,2}, then find the number of relation from A to B.

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

146) If R = {(x,y) : x, y ∈ N, x < 5 and y = 3} is a relation, then find domain and range of R.

147) Let a={1,2,3,5} and B={4,6,9}. If a relation R from A to B is defined by R= {(x,y): the difference between x and y is odd, x ∈ A,y ∈ B}, then write R in roster form.

148) Find the sum and difference of the identity function and the modulus function.If f and g are two functions, then their sum is defined by (f+g)(x) = f(x) + g(x), $\forall X \varepsilon D_1 \cap D_2$, where D$_1$ and D$_2$ are domains of f and g, respectively.

149) Find the range of f(x) = x^2 + 2, $x \in R$.

150) If f(x) = $f(x) = \frac{x^2-x+1}{x^2+x+1}$, then find f (1+h).

151) If f is a real function defined by $f(x) = \frac{x-1}{x+1}$, then prove that $f(2x) = \frac{3f(x)+1}{f(x)+3}$.

152) If A = {1,2,3,4,6} and R be the relation defined on A by R= {(a,b); a ∈ A, b ∈ A and a divides b} then find domain and range of R.

153) Let A = {1,2,3}; B = {a,b,c,d} be two sets and R = {(1,a),(a,c),(2,d),(2,c)} be a relation from A to B, then find R^{-1} ,range of R and domain of R.

154) If A={1,4}, B= {2,3,6} and C= {2,3,7}, then verify that
$A \times (B \cap C) = (A \times B) \cap (A \times C)$

155) If $f(x) = \frac{x+1}{x-1}$, then find $f(x^2)$ and $[f(x)]^2$.

156) Find the domain of $f(x) = \frac{1}{\sqrt{x+|x|}}$

157) If A = {1,2,3}, B = {3,4} and C = {4,5,6}, then find $A \times (B \cap C)$

158) If A = {1,2,3},B = {3,4} and C = {4,5,6}, then find $(A \times B) \cap (A \times C)$

159) Determine the domain and range of the relations R, where R = (x, x^3) : x is a prime number less than 10}

160) Express R = {(x,y) : x^2+ y^2= 25, where x,y ∈ W} as a set of ordered pairs

161) Find the quotient of the identify function by the modulus function.

162) If the function 't' which maps temperature in degree Celsius into temperature in degree Fahrenheit is defined by $t(c) = \frac{9C}{5} + 32,$ then find t (28)

163) If the function 't' which maps temperature in degree Celsius into temperature in degree Fahrenheit is defined by $t(c) = \frac{9C}{5} + 32,$ then find t (-10)

164) If the function 't' which maps temperature in degree Celsius into temperature in degree Fahrenheit is defined by $t(c) = \frac{9C}{5} + 32,$ then find the value of C when t(c) = 212

165) Find the range of $f(x) = \frac{x-2}{3-x}$

166) Determine the domain and range of the relation R, where R = {(-3,1),(-1,1),(1,0),(3,0)}

167) Determine the domain and range of the relation R, where R = {(x-2,x^2) : x is a prime number less than 15}

168) Let A = {2,4,6,9} and B = {4,6,18,27,54}, find the set of ordered pair (a,b) such that a ∈ A,b ∈ B, a is a factor of b, and a< b.

169) Find the product of the identity function and the reciprocal function.

170) Suppose a relation R = {(1,4),(2,5),(4,4),(6,5)} is defined from A to B. Find the inverse of R. Also, find the domain and range of R^{-1} ?

171) Let λ be a non-zero number and f : R → R be a function defined by $f(x) = \frac{x}{\lambda} \forall x \epsilon R$. Find λf

172) Let λ be a non-zero number and f : R → R be a function defined by $f(x) = \frac{x}{\lambda} \forall x \in R$. Find $\lambda^2 f$

173) Let λ be a non-zero number and f : R → R be a function defined by $f(x) = \frac{x}{\lambda} \forall x \epsilon R$. Find $\left(\frac{1}{\lambda}\right) f$

174) Find the domain and range of $f(x) = \left\{\left(x, \frac{1}{1-x^2}\right) : x \in R, \quad x \neq \pm 1\right\}$

175) Let R be a relation on Q,defined by
R=, $\{(a,b) : a,b \in Q$ and $a - b \in Z\}$ show that
$(a,a) \in R, \forall a \in Q$

176) Let R be a relation on Q,defined by
R=, $\{(a,b) : a,b \in Q$ and $a - b \in Z\}$ show that
$(a,b) \in R \Rightarrow (b,a) \in R$

177) Let R be a relation on Q,defined by
R=, $\{(a,b) : a,b \in Q$ and $a - b \in Z\}$ show that
$(a,b) \in R \Rightarrow and \quad (b,c) \in R \Rightarrow (a,c) \in R$

178) Let f be the exponential function and g be the logarithmic function. Find (f + g) (1)

179) Let f be the exponential function and g be the logarithmic function. Find (f .g) (1)

180) Let f be the exponential function and g be the logarithmic function. Find (3f) (1)

181) Let f be the exponential function and g be the logarithmic function. Find (5g) (1)

182) Let a relation R_1 on the set R of all real numbers be defined as $(a,b) \in R_1 \Leftrightarrow 1 + ab > 0$ for all
$a, b \in R$.
Show that
$a, b \in R.$ for all $a \in R$

183) Let a relation R_1 on the set R of all real numbers be defined as $(a,b) \in R_1 \Leftrightarrow 1 + ab > 0$ for all
$a, b \in R$.
Show that
$(a,b) \in R_1 \Rightarrow (b,a) \in R_1 \quad for \quad all \quad a,b \in R$

184) Find the domain and range of the function $f(x) = \left\{\left(x, \frac{x^2-1}{x-1}\right) : x \in R, \quad x \neq 1\right\}$

185) Let $f : R \to R$ be such that $f(x) = 2^x$. Determine range of f

186) Let $f : R \to R$ be such that $f(x) = 2^x$. Determine whether f (x + y) = f(x) . f(y) holds

187) Let $f : R \to R$ be such that $f(x) = 2^x$. Determine {x : f(x) =1}

188) Find the domain and range of the real-valued function f(x) given by $f(x) = \frac{4-x}{x-4}$

189) Find the domain and range of the function $f(x) = 1 - |x - 2|$

190) Let R be the relation on the set Z of all integers defined by $(x,y) \in R \Rightarrow x - y$ is divisible by
n.Prove that
$(x,x) \in R, \forall x \in Z$

191) Let R be the relation on the set Z of all integers defined by $(x,y) \in R \Rightarrow x - y$ is divisible by
n.Prove that
$(x,y) \in R \Rightarrow (y,x) \in R, \forall x, y \in Z$

192) Let R be the relation on the set Z of all integers defined by $(x,y) \in R \Rightarrow x - y$ is divisible by
n.Prove that
$(x,y) \in R \quad and \quad (y,z) \in R \Rightarrow (x,z) \in R \quad for \quad all \quad x,y,z \in Z$

193) Let A be the set of two positive integers. Let $f : A \to Z^+$ (set of positive integers) be defined by f(n)=p, where p is highest prime factor of n. If range of f={3}. Find set A. Is A uniquely determined?

194) Find the domain and range of the function $f(x) = \frac{1}{2-\sin 3x}$

195) Let $A \subseteq N$ and $f : A \to A$ be defined by
f(x)=higest prime factor of n
If range of f is A. Determined A. Is A uniquely determined.

196) Let R be a relation of N defined by R={(a,b):a,bϵN and a=b^2} Are the following true?
(a,a)ϵR for all aϵN

197) Let R be a relation of N defined by R={(a,b):a,bϵN and a=b^2} Are the following true?
$(a,b)\epsilon R \Rightarrow (b,a)\epsilon R$

198) Let R be a relation of N defined by R={(a,b):a,bϵN and a=b^2} Are the following true?
$(a,b)\epsilon R, (b,c)\epsilon R \Rightarrow (a,c)\epsilon R$

199) Find the domain of each of the following functions given by
$f(x) = \frac{1}{\sqrt{x-|x|}}$

200) Find the domain of each of the following functions given by
$f(x) = \frac{1}{\sqrt{x+|x|}}$

201) Find the domain of each of the following functions given by
$f(x) = \frac{1}{\sqrt{x-[x]}}$

202) Find the domain of each of the following functions given by
$f(x) = \frac{1}{\sqrt{x+[x]}}$

203) State whether each of the following statements are true or false. If the statements is false, then rewrite the given statement correctly.
If A and B are non-empty sets, then A x B is a non-empty set of ordered pairs (x,y) such that $x \in B$ and $y \in A$.

204) State whether each of the following statements are true or false. If the statements is false, then rewrite the given statement correctly.
If A = {1, 2} and B = {3, 4}, then $A \times (B \cap \phi) = \phi$

205) Find the domain of the function f(x) given by
$f(x) = \frac{1}{\log_{10}(1-x)} + \sqrt{x+2}$

206) Find the domain of the function f(x) given by f(x)=$\log_4\{\log_5 \log_3(18x - x^2 - 77))\}$

207) Find the domain of the real function $f(x)$ defined by f(x)= $f(x) = \frac{1-|x|}{2-|x|}$

208) If h denote the number of honest people and p denotes the number of punctual people and a relation between honest people and punctual people is given as h=p+16. If P denotes the number of peolple who progress in life and a relation between number of people who
progress and honest is given as $P = \left(\frac{h}{8}\right) + 5$
Find the relation between number of people who progress in life and punctual. How does the punctuality is important in the progress of life?

209) Let A = {1,2,3,4} and B = {1,4,9,16,25} and R be a relation defined from A to B as R = {(x,y)
: $x \in A, y \in B$ and $y = x^2$} . Find domain of R

210) Let A = {1,2,3,4} and B = {1,4,9,16,25} and R be a relation defined from A to B as R = {(x,y)
: $x \in A, y \in B$ and $y = x^2$} . Find range of R

211) Let A = {1,2,3,4} and B = {1,4,9,16,25} and R be a relation defined from A to B as R = {(x,y)
: $x \in A, y \in B$ and $y = x^2$} . Write codomain of R

212) Let A={1,2,3,4} and B={1,4,9,16,25} and R be a relation defined from A to B as
R={(x,y):: $x \in A, y \in B$ and $y = x^2$}
Does truthfulness and honesty may have any relation?

213) Given set A={honest, violence} and B={peace, prosperity,destruction}.write the set $A \times B$ Choose one element of $A \times B$, that you would like to have in your life.

214) If A = {0, 1, 2} and B = {1, 2, 3 ,4, 5} then represent the rule f : A → B given by f(x) = x + 2 by an arrow diagram.

215) If X = {0, ±2 , 4} and Y = {0, 4, 5, 16}, then represent the rule f : X → Y given by f(x) = x² by an arrow diagram.

216) The given figure shows a relationship between the sets P and Q.Write this relation

P: 5, 6, 7   Q: 3, 4, 5

in set builder form

217) The given figure shows a relationship between the sets P and in roster from What is it domain and range?

P: 5, 6, 7   Q: 3, 4, 5

218) If A x B = {(a, x), (a, y), (b, x), (b, y)}, find A and B.

219) Find the values of x and y if (x + 4, x + 2y) = (6, 8)

220) Find the values of x and y if (x^3-x, y^2 - 5y + 6) = (0, 0)

221) If A = {1, 2, 3}, B = {3, 4} and C = {1, 3, 5}, find (A x B) ∩ (A x C)

222) If A = {1, 2, 3}, B = {3, 4} and C = {1, 3, 5}, find A x (B ∪ C)

223) If A = {1, 2, 3}, B = {3, 4} and C = {1, 3, 5}, find A x (B ∩ C)

224) If A = {a, b, c} and B = {p, q}, then find A x A

225) If A = {a, b, c} and B = {p, q}, then find B x B

226) If A = {a, b, c} and B = {p, q}, then find A x B

227) If A = {a, b, c} and B = {p, q}, then find B x A.

228) Let A = {1, 2, 3, 4, 6}. Let R be the relation on A defined by {(a, b): a, b ∈ A , b is exactly divisible by a}. Find the domain of R.

229) Let A = {1, 2, 3, 4, 6}. Let R be the relation on A defined by {(a, b): a, b ∈ A , b is exactly divisible by a}. Find the range of R.

230) Let A = {1, 2, 3}, B = {2, 3, 4, 5}, state as to which of the following sets R represents a relation of set A into set B?
If R represents a relation, write its domain and range.
R = {(1, 2), (1, 3), (2, 2)}

231) Let A = {1, 2, 3}, B = {2, 3, 4, 5}, state as to which of the following sets R represents a relation of set A into set B?
If R represents a relation, write its domain and range.
R= {(2, 1), (1, 3), (4, 3)}

232) Let A = {1, 2, 3}, B = {2, 3, 4, 5}, state as to which of the following sets R represents a relation of set A into set B?
If R represents a relation, write its domain and range.
R = {(1, 2), (2, 3), (3, 4), (3, 2)}

233) Let A = {1, 2, 3}, B = {2, 3, 4, 5}, state as to which of the following sets R represents a relation of set A into set B?
If R represents a relation, write its domain and range.
R = {(1, 1), (1, 4), (1, 5), (2, 3)}

234) Let R be a relation on set N of natural numbers defined by R = {(x, y) : x, y∈ N, x + 3y = 12} Find R in roster form

235) Let R be a relation on set N of natural numbers defined by R = {(x, y) : x, y∈ N, x + 3y = 12} Find Domain of R

236) Let R be a relation on set N of natural numbers defined by R = {(x, y) : x, y∈ N, x + 3y = 12} Find Range of R

237) Let R be a relation on the set Z of integers defined by R = {(x, y) : x, y ∈ Z, x² + y² = 25} Find R in roster form

238) Let R be a relation on the set Z of integers defined by R = {(x, y) : x, y ∈ Z, x² + y² = 25} Find Domain of R

239) Let R be a relation on the set Z of integers defined by R = {(x, y) : x, y ∈ Z, x² + y² = 25} Find Range of R

240) A function t is defined by f(x) = 2x - 5. Write down the values of f(0)

241) A function t is defined by f(x) = 2x - 5. Write down the values of f(7)

242) A function t is defined by f(x) = 2x - 5. Write down the values of f(- 3)

243) Find the range of each of the following functions f(x) = x, x is a real number.

244) Which of the following relations are functions? Give reasons if it is a function, and determine the domain and range {(2, 1), (3,1), (4, 2), (5, 6)}

245) Which of the following relations are functions? Give reasons if it is a function, and determine the domain and range{(4, 1), (6, 2), (8, 3), (10, 4), (12, 5)}

246) Which of the following relations are functions? Give reasons if it is a function, and determine the domain and range {(3, 10), (5, 12), (7, 14), (5, 16)}

247) Find the domain and range of the following functions:
f(x) = |x + 1|

248) Find the domain and range of the following functions:
$f(x) = \frac{1}{\sqrt{4-x^2}}$

249) Find the domain and range of the following functions:
f(x) = 2x + 3

250) Find the domain and range of the following functions:
f(x) = x² + 1

251) Find the domain and range of the following functions:
$f(x) = \frac{3}{2-x}$

252) Find the domain and range of the following functions:
$f(x) = x^2 - 3x + \frac{13}{4}$

253) Find the domain and range of the following functions: $f(x) = \frac{|x-3|}{x-3}, x \in R$

254) Find the domain and range of the following functions: $f(x) = \frac{1}{1-x^2}, x \in R$

255) Find the domain and range of the following functions: $f(x) = \frac{x^2-1}{x+1}, x \in R$

256) Find the domain and range of the following functions: $f(x) = \frac{1}{\sqrt{x-[x]}}, x \in R$

257) Find the domain and range of the following functions: $f(x) = 1 - |x - 3|, x \in R$

258) A function f: R → R is defined as
$$f(x) = \begin{cases} x^2 + 1 & x \le -2 \\ 2x + 1 & -2 < x \le 3 \\ 2x^3 - 3 & 3 < x < 8 \end{cases}$$
Find f(0)

259) A function f: R → R is defined as
$$f(x) = \begin{cases} x^2 + 1 & x \le -2 \\ 2x + 1 & -2 < x \le 3 \\ 2x^3 - 3 & 3 < x < 8 \end{cases}$$
Find f(3)

260) A function f: R → R is defined as
$$f(x) = \begin{cases} x^2 + 1 & x \le -2 \\ 2x + 1 & -2 < x \le 3 \\ 2x^3 - 3 & 3 < x < 8 \end{cases}$$
Find f(5)

261) A function f: R → R is defined as
$$f(x) = \begin{cases} x^2 + 1 & x \le -2 \\ 2x + 1 & -2 < x \le 3 \\ 2x^3 - 3 & 3 < x < 8 \end{cases}$$
Find f(-1)

262) A function f: R → R is defined as
$$f(x) = \begin{cases} x^2 + 1 & x \le -2 \\ 2x + 1 & -2 < x \le 3 \\ 2x^3 - 3 & 3 < x < 8 \end{cases}$$
Find f(-3)

263) Find the domain and range of the real function f defined by f(x) = $\sqrt{x - 1}$

264) Find the domain of f(x) = $\frac{1}{x+2}$

265) Find the domain and range of the function $f(x) = \frac{x^2 - 9}{x - 3}$

266) Find the domain and range of the function f(x) = 1-|x - 3|.

267) Find the domain of the function $f(x) = \frac{x^2 + 3x + 5}{x^2 + x - 6}$

268) Find x and y when (3x + 2y, x + 4y - 1) = (6, 6).

269) Let A = {1, 2, 3, 4} and B = {5, 6}. Find A x B and B x A. Show that(i) A x B ≠ B x A (ii) n (A x B) = n (B x A)

270) Let A = {1, 3}, B = {2, 4} and C = {1, 5}. Find A x A x A

271) Let A = {1, 3}, B = {2, 4} and C = {1, 5}. Find A x B x C

272) Find the domain and range of f (x) = $\sqrt{x - 2}$

273) Find the domain and range of f (x) = f(x) = |x-5|

274) A function f: R→ R is defined as f(x) = $\begin{cases} 2x + 3, x \ge 3 \\ 7, x < 3 \end{cases}$
find f(1)

275) A function f: R→ R is defined as f(x) = $\begin{cases} 2x + 3, x \ge 3 \\ 7, x < 3 \end{cases}$
find f(1)

276) A function f: R→ R is defined as f(x) = $\begin{cases} 2x + 3, x \ge 3 \\ 7, x < 3 \end{cases}$
find f(1)

277) Determine the domain and range of the relation: R = {(x, x²): x is prime, 10≤ x ≤ 30}.

278) Determine the range and domain of the relation: R = {(x, y): y = I x + 1|, x ∈ Z, IxI ≤ 3}.

279) If f(x) = x²- 3x + 4, find values of x satisfying f(x) = f(2x + 1).

280) If f(x) = $x^3 - \frac{1}{x^3}$,Then find f(x) + f($\frac{1}{x}$) = 0

281) Let A = {1,2,3}, B = {3,4} and C = {4,5,6}. Find $(A \times B) \cup (A \times C)$

282) Let f(x) = $\sqrt{x}$ and g(x) = x be two functions defined over the set of non negative real numbers. Find (f – g) (x)

283) Let f(x) = $\sqrt{x}$ and g(x) = x be two functions defined over the set of nonnegative real numbers. Find (fg) (x)
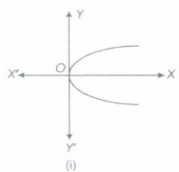
284) Let f(x) = $\sqrt{x}$ and g(x) = x be two functions defined over the set of non negative real numbers. Find $\left(\frac{f}{g}\right)(x)$

285) A function f is defined by f(x) = 2x –5. Write down the values of f (7)
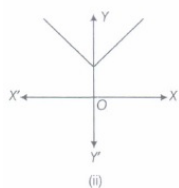
286) A function f is defined by f(x) = 2x –5. Write down the values of f (–3).

287) If A x B = {(a, x), (a, y), (b, x), (b, y)}, then find A and B.

288) Identify the curve, which is a relation or function.

289) Identify the curve, which is a relation or function.

290) Which of the relations are functions?
(i) f₁ = {(2,1), (3, 1), (4,1), (3, 2), (4,2), (4, 3)}
(ii) f₂ = {(1,4), (2, 3),(3,2), (4,1)}

291) Let f be a relation on the set N of natural numbers defined by f = {(n, ∈ 3n): n N}. Is f a function from N to N. If so, find the range of f.

292) Let $f: Z \to Z, g: Z \to Z$ be functions defined by $\begin{aligned} f &= \left\{(x, x^2) : x \in Z\right\} \\ g &= \left\{\left(x, |x|^2\right) : x \in Z\right\} \end{aligned}$ show that f = g

293) Let f :R → R be given by f(x) = x² + 3.Find (x : f (x) = 28)

294) In question 4, find the pre-images of 39 and 2 under f.

295) If f (x) = 3x⁴ - 5 x² + 9, find f (x -1)

296) Let f be defined by f (x) = (x - 4) and g be defined by g(x) = $\begin{cases} \frac{x^2-16}{x+4}, & x \neq -4 \\ \lambda, & x = -4 \end{cases}$ Find λ such that f(x) = g(x) for all x

297) If f : R → R be defined as follows $f(x) = \begin{cases} 1, & x \in Q \\ -1, & x \notin Q \end{cases}$ Find
(i) $f\left(\frac{1}{2}\right)$, $f(\pi)$
(ii) pre-image of 1and-1

298) A function f : R → R is defined by f(x) = x²
Determine
(i) Range of f
(ii) {x : f(x) = 4}

299) If A = {1, 2, 3, 4}, B = {1,2, ... , 10} and f : A → B is a function defined by f(x) = 2x + 1, x ∈ A, then find the range of f.

300) Find the domain of the function $f(x) = \frac{x}{x^2+3x+2}$

301) If f(x) = $x + \frac{1}{x}$, prove that $[f(x)]^3 = f\left(x^3\right) + 3f\left(\frac{1}{x}\right)$

302) Is g = {(1, 1), (2,3), (3,5), (4, 7),} a function, justify? If this is described by the relation, g(x) = $\alpha x + \beta$, then what values should be assigned to α and β?

303) Let f(x) = x² and g(x) = 2x + 1be two real functions.
Find (i) f + g
(ii) f - g
(iii) f . g
(iv) $\frac{f}{g}$

304) Draw the graph of the following function. Also, determine their domain and range.
f(x) = 2

305) Draw the graph of the following function. Also, determine their domain and range
f(x) = -2

306) Draw the graph of the following function. Also, determine their domain and range
f(x) = |x - 3|

307) Draw the graph of the following function. Also, determine their domain and range
$f(x) = \begin{cases} x^2, & x \geq 0 \\ x, & x < 0 \end{cases}$

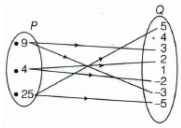**3 Marks**   88 x 3 = 264

308) Let A = {1, 2} and B = {3, 4}. How many subsets will A x B have? List them.

309) If f(x) = x², find $\frac{f(1.1)-f(1)}{1.1-1}$

310) Let A = {1, 2, 3, 4, 5, 6}. Define a relation R from A to A by R = {(x, y) : y = x + 1 }
(i) Depict this relation using an arrow diagram.
(ii) Write down the domain, codomain and range of R.

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

312) Let A = {1, 2}, B = {1, 2, 3, 4}, C = {5, 6} and D = {5, 6, 7, 8}. Verify that
A x (B∩ C) = (A x B)∩ (A x C)

313) Let A = {1, 2}, B = {1, 2, 3, 4}, C = {5, 6} and D = {5, 6, 7, 8}. Verify that
A x C is a subset of B x D.

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

315) The Fig shows a relationship between the sets P and Q. Write this relation (i) in set-builder form (ii) roster form. What is its domain and range?

Fig 2.7
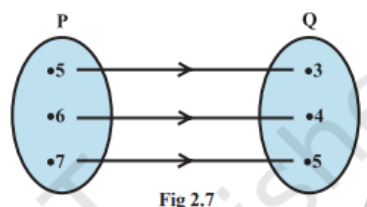
316) Let A = {1, 2, 3,......,14}. Define a relation R from A to A by R = {(x, y): 3x - y = 0, where x, Y∈ A}. Write down its domain, codomain and range.

317) Define a relation R on the set N of natural numbers by R = {(x, y): y =x + 5, x is a natural number less than 4; x, Y∈N}. Depict this relationship using roster form. Write down the domain and the range.

318) 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 ∈ A, y ∈ B}. Write R in roster form.

319) Determine the domain and range of the relation R defined by R = {(x, x + 5): x ∈ {0, 1, 2, 3, 4, 5}}

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

321) Let R be the relation on Z defined by R = {(a, b): a, b ∈ Z, a - b is an integer}. Find the domain and range of R.

322) Which of the following relations are functions? Give reasons. If it is a function determine its domain and range.
(i) {(2,1), (5,1), (8,1), (11,1), (14,1), (17,1)}
(ii) {(2,1), (4,2), (6,3), (8,4), (10,5), (12,6), (14,7)}
(iii) {(1,3), (1,5), (2,5)}.

323) Find the range of each of the following functions
(i) f(x) = 2 - 3x, x ∈ R, x > 0
(ii) f (x) = x^2 + 2, x is a real number.
(iii) f (x) = x, x is a real number.

324) Find the domain and the range of the real function f defined by f(x) = |x-1|.

325) Let f = $[(x, \frac{x^2}{1+x^2}) : x ∈ R]$ be a function from R into R. Determine the range of f.

326) Let A = {1,2,3}, B = {3,4} and C = {4,5,6}. Find
(i) A × (B ∩ C)
(ii) (A × B) ∩ (A × C)
(iii) A × (B ∪ C)
(iv) (A × B) ∪ (A × C)

327) Examine each of the following relations given below and state in each case, giving reasons whether it is a function or not?
(i) R = {(2,1),(3,1), (4,2)}
(ii) R = {(2,2),(2,4),(3,3), (4,4)}
(iii) R = {(1,2),(2,3),(3,4), (4,5), (5,6), (6,7)}

328) Define the function f: R ⇒ R by y = f(x) = x^2, x ∈ R. Complete the table given below by using this definition. What is the domain and range of this function? Draw the graph of f.

x		-4	-3	-2	-1	0	1	2	3	4
y = f(x) = x^2										

329) Draw the graph of the function f :R ⇒ R defined by f (x) = x^3, x∈ R

330) Define the real valued function f: **R** − {0} → **R** defined by $f(x) = \frac{1}{x}$,x ∈ **R** − {0} . Complete the Table given below using this definition. What is the domain and range of this function?

x		-2	-1.5	-1	-0.5	0.25	0.5	1	1.5	2
$y = \frac{1}{x}$	..	..		..	..	..		..	..	..

331) Let R be the set of real numbers. Define the real function $f : **R** → **R**$ by $f(x) = x + 10$ and sketch the graph of this function.

332) Let R be a relation from Q to Q defined by R = {(a,b): a,b ∈ Q and a − b ∈ Z}. Show that
(i) (a,a) ∈ R for all a ∈ Q
(ii) (a,b) ∈ R implies that (b, a) ∈ R
(iii) (a,b) ∈ R and (b,c) Î R implies that (a,c) ∈ R

333) Find the domain and the range of the real function f defined by f (x) = $\sqrt{(x − 1)}$

334) Let A and B be two sets, such that A x B consists of 6 elements. If 3 elements of A x B are (1, 4), (2, 6) and (3, 6), then find A x B and B x A.

335) Determine the domain and range of the relation R, where R = {(2x+3, x^3)} : x is a prime number less than 10}.

336) If f and g be two real function defined by $f(x) = \sqrt{x+1}$ and $g(x) = \sqrt{9-x^2}$. Then, describe each of the following functions. **f+g**

337) If f and g be two real function defined by $f(x) = \sqrt{x+1}$ and $g(x) = \sqrt{9-x^2}$. Then, describe each of the following functions. **g-f**

338) If f and g be two real function defined by $f(x) = \sqrt{x+1}$ and $g(x) = \sqrt{9-x^2}$. Then, describe each of the following functions. **f.g**

339) If f and g be two real function defined by $f(x) = \sqrt{x+1}$ and $g(x) = \sqrt{9-x^2}$. Then, describe each of the following functions. $\frac{f}{g}$

340) If f and g be two real function defined by $f(x) = \sqrt{x+1}$ and $g(x) = \sqrt{9-x^2}$. Then, describe each of the following functions. $\frac{g}{f}$

341) If f and g be two real function defined by $f(x) = \sqrt{x+1}$ and $g(x) = \sqrt{9-x^2}$. Then, describe each of the following functions. $2f - \sqrt{5}g$

342) If f and g be two real function defined by $f(x) = \sqrt{x+1}$ and $g(x) = \sqrt{9-x^2}$. Then, describe each of the following functions. $f^2 + 7f$

343) If f and g be two real function defined by $f(x) = \sqrt{x+1}$ and $g(x) = \sqrt{9-x^2}$. Then, describe each of the following functions. $\frac{5}{g}$

344) If X = {1, 2, 3, 4, 5}, Y = {1, 2, 5, 6, 7, 9, 10, 11, 12, 13, 14} and $f : X \to Y$ be defined by f(x) = 2x+3, then find the domain and range of f.

345) If A = {a,d}, B = {b,c,e} and C = {b,c,f}, then verify that $A \times (B \cup C) = (A \times B) \cup (A \times C)$

346) If A = {a,d}, B = {b,c,e} and C = {b,c,f}, then verify that $A \times (B \cap C) = (A \times B) \cap (A \times C)$

347) Is g = {(2, 3), (4, 5), (6, 7)} a function? If this is described by the formula $g(x) = \alpha x + 2\beta$ then what values would be assigned to a α and β ?

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

349) Suppose a set A = {January, February, August} and Set B = {28,15,30}. Write a relation R given by R = {(a,b)ϵ AxB where a is month and b is date}. Also, find R^{-1} .

350) Find the domain of the function f defined by $f(x) = \sqrt{4-x} + \frac{1}{\sqrt{x^2-1}}$

351) If $f(x) = \log(1-x)$ and, $g(x) = [x]$ then determine each of the following functions. $f+g$. Also, find: $(f+g)(-1)$

352) If $f(x) = \log(1-x)$ and , $g(x) = [x]$ then determine each of the following functions. $f.g$ Also, find: $(f.g)(0)$

353) If $f(x) = \log(1-x)$ and , $g(x) = [x]$ then determine each of the following functions. $\frac{f}{g}$. Also, find: $\left(\frac{f}{g}\right)\left(\frac{1}{2}\right)$

354) If $f(x) = \log(1-x)$ and, $g(x) = [x]$ then determine each of the following functions. $\frac{g}{f}$. Also, find: $\left(\frac{g}{f}\right)\left(\frac{1}{2}\right)$

355) If a function $f : R \to R$ be defined by
$$f(x) = \begin{cases} 3x - 2, & x < 0 \\ 1, & x = 0 \\ 4x + 1, & x > 0 \end{cases}$$
Find f(1), f(-1), f(0), f(2).

356) If f(x) = $f(x) = \begin{cases} x^2, & x < 0 \\ x, & 0 \le x < 1 \\ \frac{1}{x}, & x \ge 1 \end{cases}$ Find $f(\frac{1}{2})$

357)

If f(x) = $f(x) = \begin{cases} x^2, & x < 0 \\ x, & 0 \le x < 1 \\ \frac{1}{x}, & x \ge 1 \end{cases}$

Find f (-2)

358)

If f(x) = $f(x) = \begin{cases} x^2, & x < 0 \\ x, & 0 \le x < 1 \\ \frac{1}{x}, & x \ge 1 \end{cases}$

Find f (1)

359)

If f(x) = $f(x) = \begin{cases} x^2, & x < 0 \\ x, & 0 \le x < 1 \\ \frac{1}{x}, & x \ge 1 \end{cases}$

Find $f(\sqrt{3})$

360) Let A = {-1,3,4} and B = {2,3}. Represent the product $A \times B$ graphically.

361) Let f : R $\rightarrow$ R defined f(x) = 1 - x^2 for all x $\in$ R$^+$. Find its domain and range. Also, draw its graph.

362) If A = {2,4,6} and B = {1,4} then show that $A \times B \ne B \times A$.   Also, show it graphically.

363) Draw the graph of f(x) = $\frac{1}{2}$ x^3 . Also, find it domain and range.

364) If A={1,3,6} and B={X,Y} ,then represent the following catesian products by an arrow diagrams
$A \times B$

365) If A = {1,3,6} and B = {X,Y}, then represent the following catesian products by an arrow diagrams $B \times A$

366) Find the domain and the range of the function $f(x) = \sqrt{16 - x^2}$

367) If A = {1,3,6} and B = {X,Y}, then represent the following catesian products by an arrow diagrams $A \times A$

368) If A = {1,3,6} and B = {X,Y}, then represent the following catesian products by an arrow diagrams $B \times B$

369) Let A = {1,2,3} and B = {3,4}.Represent following product graphically
$A \times B$

370) Let A={1,2,3} and B={3,4} .Represent following graphically
$B \times A$

371) Let A = {1,2,3} and B = {3,4} .Represent following product graphically
$A \times A$

372) If A = {a,b,c} and B = {x,y}, then represent the following cartesian product by an arrow diagram.
$A \times B$

373) If A = {a,b,c} and B = {x,y}, then represent the following cartesian product by an arrow diagram.
$B \times A$

374) If A = {a,b,c} and B = {x,y}, then represent the following cartesian product by an arrow diagram
$A \times A$.

375) If A= {a,v,c} and B={x,y},then represent the following cartesian product by an arrow diagram.
$B \times B$

376) Draw the graph of each the following function f(x) = 5

377) Draw the graph of each the following function f(x) = -5

378) Write the relation between set P and Q given by an arrow diagram in
(i) roster form   (ii) set-builder form

379) Draw the graph of each the following function f(x) = 0

380) A relation R is defined, from a set of A = {2,3,4,5} to a set B = {3,6,7,10},as $(x, y) \in R \Leftrightarrow x$ is relatively prime to y. Express R as a set of ordered pairs and depict this relations by arrow diagram.

381) Let A={1,2,3,4,5}.Define a relation R from A to A by $R = \{(x, y) : y = x - 1, x, y \in A\}$
(i) Depict this relation using an arrow diagram.
(ii) Write down the domain, codomain and range of R.

382) Let A={1,2,3,4,5}.Define a relation R from A to A by $R = \{(X, Y) : Y = x - 1.x. y \in A\}$

383) Let A = {1,2,3,4} and B = {1,4,9,16,25} and R be a relation defined from A to B as
$R = \{(x, y) : x \in A, y \in B, \quad and \quad y = x^2\}$.
Depict this relation using arrow diagram

384) Which of the following relations are functions? Give reasons. If it is a function determine its domain and range. {(2, 1), (4, 2), (6, 3), (8, 4), (10, 5), (12, 6),(14, 7)}

385) 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)}

386) Find the range of each of the following functions f(x) = x² + 2, x is a real number

387) Let A = {1,2,3} and B = {3,4} .Represent following product graphically for B x A.

388) Find the domain and range of the function f(x) = $\frac{1}{\sqrt{x-5}}$

389) Let f = $\left\{ \left(x, \frac{x^2}{1+x^2} \right) : x \in R \right\}$ be a functions R into R determine the range of R.

390) Let f and g be real functions defined by f (x) = 2x + 1and g(x) = 4x - 7.
(i) For what real numbers x, f(x) = g(x)?
(ii) For what real numbers x, f(x) < g(x)?

391) Find the range of the following function $f(x) = \frac{x}{1+x^2}$

392) If f(x) = $\frac{1}{2x+1}, x \neq -\frac{1}{2}$ then show that $f(f(x)) = \frac{2x+1}{2x+3}$ provided that $x \neq -\frac{3}{2}$

393) If A and B be two sets, such that n(A) = 3 and n(B) = 2 If (x, 1),(y,2) and (z,1) are in A x B, then find A,B and A x B, where x,y and z are distinct elements.

394) Draw the graph of the function f : R → R such that f(x) = Ix - 2I·

395) f(x) = 1- x²

Case Study Questions   2 x 4 = 8

396) Hanuman Pareek and Pawan Saini are two students of class XI th in a school. The ages of both students is represented by f and g be real functions defined by $f(x) = \sqrt{x + 4}$ and $g(x) = \sqrt{16 - x^2}$. Then, answer the some questions which are based on above ages.
(i) Find the domain of sum of both ages, i.e. (f+g)
(a)   **(b)**   **(c)**   **(d)**
[-4,4]   [-2,2]   [-3,3]   [-5,5]
(ii) Find the product of both ages, i.e. (f g)
(a) $(x + 2)\sqrt{4 - x}$ **(b)** $(x + 4)\sqrt{4 - x}$ **(c)** $(x + 4)\sqrt{x - 2}$ **(d)** $(x + 3)\sqrt{x - 2}$
(iii) Find the difference of both ages, i.e. (f-g)
(a) $\sqrt{x - 4} - \sqrt{4 - x^2}$ **(b)** $\sqrt{x + 4} - \sqrt{4 - x^2}$ **(c)** $\sqrt{x + 4} - \sqrt{16 - x^2}$ **(d)** $\sqrt{x + 6} - \sqrt{x - 6}$
(iv) Find the domain of $\left(\frac{f}{g} \right)$.
(a)   **(b)**   **(c)**   **(d)**
(-4,4)   (-2,2)   (-3,3)   (-5,5)
(v) Find the $\left(\frac{f}{g} \right)$
(a) $\frac{1}{\sqrt{5+x}}$ **(b)** $\frac{1}{\sqrt{4+x}}$ **(c)** $\frac{1}{\sqrt{4-x}}$ **(d)** $\frac{1}{\sqrt{2+x}}$

397) Mr. Abhishek Dubey a Mathematics class XIth teacher of write a problem on black board totest the Function". preparation about the topic 'Relation and The problem is describe as following:

"Let A be a relation be set of on first A ten natural numbers and let R defined by

$(x, y) \in R \Leftrightarrow x + 2y = 14$

i.e., $R = \{(x, y) : x \in A, y \in A$ and x+2 y=14\} ".

Then, answer the following questions which are based on above problem.

(i) Find the relation (R)

(a) {(2, 4), (4, 3), (6, 2), (8, 1)}
(b) {(2, 6), (4, 5), (6, 4), (8, 3)}
(c) {(4, 2), (3, 4), (2, 6), (1, 8)}
(d) **None of the above**

(ii) Find the R^{-1}.

(a) {(4, 2), (3, 4), (2, 6), (1, 8)}
(b) {(6, 2), (5, 4), (4, 6), (3, 8)}
(c) {(2, 4),(4, 3), (6, 2), (8, 1)}
(d) {(2,6), (4, 5), (6, 4), (8, 3)}

(iii) Find Dom(R)

(a) {2, 4, 6, 8}
(b) {3, 5, 6, 8}
(c) {4, 3, 2, 1}
(d) {4, 5, 6, 8)

(iv) Find Range (R).

(a) {6, 5, 4, 3)
(b) {6, 3, 8, 7}
(c) {2, 4, 8, 10}
(d) {5, 3, 1, 9}

(v) Find Dom (R^{-1})

(a) {4, 3, 2, 1}
(b) {4, 5, 6, 8}
(c) {2, 4, 6, 8}
(d) {3, 5, 6, 8}

5 Marks — 53 x 5 = 265

398) If 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.

399) 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).

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

401) Find the domain and range of the following real functions

(i) $f(x) = -|x|$

(ii) $f(x) = \sqrt{9 - x^2}$

402) The relation f is defined by

$$f(x) = \begin{cases} x^2, & 0 \le x \le 3 \\ 3x, & 3 \le x < 10 \end{cases}$$

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.

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

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

405) 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.

406) Let R be a relation from N to N defined by R = {(a, b): a, b ∈ N and a = b^2}. Are the following true?

(i) (a, a) ∈ R for all a∈ N

(ii) (a, b)∈ R implies (b, a)∈ R

(iii) (a, b)∈ R, (b, c) ∈ R implies (a, c)∈ R

407) Let A = {1, 2, 3, 4},B = {1, 5, 9, 11, 15, 16} and f = {(1,5), (2, 9), (3, 1), (4, 5), (2, 11)}. Are the following true?

(i) f is a relation from A to B

(ii) f is a function from A to B

Justify your answer in each case

408) Let f be the subset of Z x Z defined by f = {(ab,a + b) : a, b ∈ Z}. Is f a function from Z to Z? Justify your answer.

409) Let A = {9, 10, 11, 12, 13} and let f : A→ N be defined by f(n) = the highest prime factor of n. Find the range of f.

410) Find the domain and range of the following relations. R = {(x,y): $x, y \in N$, y =x^2+ 3 and 0 < x < 5}.

411) Find the domain and range of the following relations. R = {(x,y):$x, y \in N$, $y = \frac{1}{1+x}$ and x is odd natural number}

412) Determine the domain and range of the following relations. $R_1 = \left\{ \left(x, \frac{1}{x}\right) : 0 < x < 6, x \in N \right\}$

413) Determine the domain and range of the following relations. R_2 = {(x, x^2): x is prime number less than 10}

414) If f(x) = $\begin{cases} 1 + x, -1 \le x < 0 \\ x^2 - 1, \quad 0 \end{cases}$

Then, find f(3), f(-2), f(0), $f(\frac{1}{2})$, f(2-h) and f(-1+h), where h > 0 is very small.

415) Write the following after removing the modulus $f(x) = |2x - 1|, -1 \le x \le 1$.

416) Let A = {-3, -2, -1, 4} and $f : A \to Z$ given by f(x) = x^2+x+2 Find the range of f.

417) Let A = {-3, -2, -1, 4} and $f : A \to Z$ given by f(x) = x^2+x+2 Find pre-images of 6 and 4.

418) Find the domain and range of the following real functions. f(x) = - |2x|

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

420) Find the range of the function f(x) = 1-|x+2|.

421) Find the range of the function $f(x) = \frac{|x+4|}{x+4}$.

422) Let A = {8, 11, 12, 15, 18, 23} and f is a function from $A \to N$ such that f(x) = highest prime factor of x, find f and its range.

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

424) If $f(x) = \sqrt{x^2 + 1}$ and g(x) = 2x²+3, then find (f+g) (x).

425) Find the product of the identity function and the modulus function.

426) Find the simplified form of $f(x) = |x - 2| + |2 + x|, \quad if -3 \le x \le 3.$

427) Everyone wants to be perfect ideal human being. Let us assume that dishonesty is one of the factors that affects our perfectness and perfectness has an inverse relation with dishonesty. For any value x of level of dishonesty, we have a unique value y of perfection.

Write down the equation that relates y with x.

428) Everyone wants to be perfect ideal human being. Let us assume that dishonesty is one of the factors that affects our perfectness and perfectness has an inverse relation with dishonesty. For any value x of level of dishonesty, we have a unique value y of perfection.

Does this relationship from $x \in (0, \infty)$ to $y \in (0, \infty)$ form a function?

429) Everyone wants to be perfect ideal human being. Let us assume that dishonesty is one of the factors that affects our perfectness and perfectness has an inverse relation with dishonesty. For any value x of level of dishonesty, we have a unique value y of perfection.

For what level of dishonesty one van achieve $(\frac{1}{4})$ th level of perfection?

430) Everyone wants to be perfect ideal human being. Let us assume that dishonesty is one of the factors that affects our perfectness and perfectness has an inverse relation with dishonesty. For any value x of level of dishonesty, we have a unique value y of perfection.
What will be the change in level of perfection when the level of dishonesty changes from 4 to 22?

431) Find the domain and range of the function $f(x) = \frac{x^2-9}{x-3}$

432) Find the domain of the function $f(x) = \frac{x^2+3x+5}{x^2+x-6}$

433) Let A = {1, 2} and B = {3, 4}, write A x B. How many sub sets will A x B have? List them

434) If Ax B = {(a, 1), (a, 3), (b, 1), (b, 3), (c,1), (c,3)}, then find A, Band B x A.

435) Let A and B be two sets such that A x B consists of 6 elements. If three elements of A x B are (1, 4), (2, 6), (3, 6). Find A x Band B x A.

436) If the relation R is defined by R = {(2x + 1, 2x): x = 1, 2, 3, 4} then find domain and range of R.

437) Determine the domain and range of the relation defined as: R = {(a, b) : a, b∈ N, a < 5, b = 3a + 1}

438) Let A= {x, y} and B = {a, b}, How many relations are there from A to B. Write all the relations

439) Find the domain and range of the following real functions $f(x) = \sqrt{9 - x^2}$

440) Let (x) = 2x + 5 and g(x) = x² + x.
f+ g Find the domain

441) Let (x) = 2x + 5 and g(x) = x² + x.
f- g Find the domain

442) Let (x) = 2x + 5 and g(x) = x² + x.
fg Find the domain

443) Let (x) = 2x + 5 and g(x) = x² + x.
$\frac{f}{g}$ Find the domain

444) Find the domain of the function f given by f(x)= $\frac{1}{\sqrt{[x]^2-[x]-6}}$

445) f f(x) =x² find $\frac{f(1.1)-f(1)}{(1.1-1)}$.

446) If A ⊂ B then prove that A x A = (A x B) ∩ (B x A).

447) If A and B are any two non-empty sets, then prove that A x B = B x A ⇔ A = B

448) Let A, B, C and D be any non-empty sets.
Prove that (A xB)∩ (CxD) =(A∩ C) x (B∩ D).

449) Let A = {1, 2, 3, 4} and B = {5, 6, 7}. If R = {(a, b) ; a ∈ A, b ∈ B} and a - b is even} then find R.

450) If R is the relation "less than" from A ={1,2, 3, 4, 5} to B = {1, 4, 5}. Write down the set of ordered pairs corresponding to R. Find the inverse of R.

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