MATHS

BOOKS - MAHAVEER PUBLICATION

FUNCTION

Question Bank

1. Write the following sets in roster set builder form A=collection of months of a year beginning with the letter J.

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2. Write the following sets in roster set builder form B=collection all the natural numbers less than 10.

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3. Write the following sets in roster set builder form C= collection of all even integers

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4. Write the following sets in roster form D= collection of all the letters of the word TRIGONOMETRY.

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5. Write the following sets in set builder form E= collection of all positive rational numbers.

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6. Let A={1,2,3},B={3,4},C={4,5,6}, find $A \times (B \cap C)$

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7. If A $= \{1, 2, 3\}, B = \{3, 4\}$ and $C = \{4, 5, 6\}$, then find each of the following :

$(i) A \times (B \cap C)$ $(ii)(A \times B) \cap (A \times C)$

$(iii) A \times (B \cup C)$ $(iv)(A \times B) \cup (A \times C)$

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

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9. Let A={1,2,3,4,....,14} Define a relation R from a set A to A by $R = \{(x, y) : 2x - y = 0, x, y \in A\}$ Write down its domain and range.

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10. Which of the following relations are functions from A to B write their domain and range if it is not a function give reason ? $f: A \to B$ is defined by

$f = \{(1, -2), (3, 7), (5, 6), (9, 0)\}, A = \{1, 3, 5, 9\}, B = \{-2, 7, -6, 0,$

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11. Which of the following relations are functions from A to B write their domain and range if it is not a function give reason ?

$f = \{(1, 0), (1, -1), (2, 3), (4, 10)\}, A = \{1, 2, 4\}, B = \{0, -1, 3, 10\}$

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12. Which of the following relations are functions from A to B write their domain and range if it is not a function give reason ?

$f = \{(a, b), (b, c), (c, b), (d, c)\}, A = \{a, b, c, d, e\}, B = \{b, c\}$

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13. Which of the following relations are functions from A to B write their domain and range if it is not a function give reason ? $f = \{(a, b), (a, 2), (b, 3), (b, 4)\}, A = \{a, b\}, B = \{b, 2, 3, 4\}$

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

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15. Show that the function $f: R \to R$ defined by $f(x) = x^2$ is neither one-one nor onto.

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16. the function $f: R \to R$ defined as $f(x) = x^3$ is

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17. Show that the function $f: R \to R$ defined by $f(x) = |x|$ is neither one one nor onto

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18. In each of the following case check whether the functions are one-one onto or bijective. Justify your answer $f: R \to R$ defined by $f(x) = 3 - 4x$

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19. in each of the following case check whether the functions are one one or onto or bijective justify your answer $f: R - \{3\} \to \{1\}$ defined by $f(x) = \frac{x-2}{x-3}$

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20. find the period of the following functions: $f(x) = 3\sin 2x$

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21. find the period of the following functions: $f(x) = \cos\left(\frac{x}{2}\right)$

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22. find the period of the following functions: $f(x) = \tan\left(\frac{x}{4}\right)$

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23. find $g0f$ and $f0g$ if $f: R \to R$ and $g: R \to R$ are given by $f(x) = \cos x$ and $g(x) = 3x^2$ also show that $g0f$ is not equal to $f0g$

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24. 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)}

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25. which of the following relation are functions and give reason if it is a function determine its domain and range $\{(2, 1), (4, 2), (6, 3), (8, 4), (10, 5), (12, 6), (14, 7)\}$

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26. 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)}

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27. if $f(x) = \frac{x-1}{|x-1|}$ find the value of f(-1) and f(2)

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28. Find the domain and range of the following function $f(x) = \sqrt{x-1}$

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29. Find the domain and range of the following function $f(x) = |x-1|$

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

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31. Find the domain and range of the following function $f(x) = x^2 + 2$

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32. Find the domain and range of the following function $f(x) = \frac{1}{x}$

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33. Find the domain and range of the following function $f(x) = -|x|$

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

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35. Find the domain and range of the following functions:

$$\frac{x^2}{1 + x^2}$$

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36. 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 integer a and b. Determine a and b

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

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

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

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40. Find the domain of the function $f(x) = \dfrac{x - 2}{3 - x}$

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41. Find the domain of the function $f(x) = 1 - |x - 2|$

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42. Find the domain of the function $f(x) = \dfrac{1}{\sqrt{x-5}}$

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43. Find the domain of the function $f(x) = \dfrac{|x-4|}{x} - 4$

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44. Find the domain of the function $f(x) = \dfrac{1}{x^3}$

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

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46. Find the domain of the function $y = \sin x$

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47. Find the domain of the function $y = \cos x$

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48. Find the domain of the function $y = \tan x$

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49. Find the domain of the function $y = \sin x + \cos x$

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50. 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 $x \neq -\frac{3}{2}$.

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51. If $f: R \to R$ is defined by $f(x) = \frac{x}{x^2+1}$ find f(f(2))

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52. If $f(x) = \frac{1}{1-x}$ show that f(f(f(x)))=x

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53. If $f(x) = \frac{x-1}{x+1}$ then show that $f\left(\frac{1}{x}\right) = -f(x)$ and $f\left(-\frac{1}{x}\right) = \frac{-1}{f(x)}$

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54. If $f(x) = x^2 - 3x + 1$ find $x \in R$ such that $f(2x) = f(x)$.

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55. If $f(x) = x^2 - 3x + 1$ find $x \in R$ such that $f(2x) = 2f(x)$

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56. Determine whether the functions are even or odd $f(x) = |-x|$

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57. Determine whether the functions are even or odd $f(x) = |x - 2|$

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58. Determine whether the functions are even or odd if $f(x) = x^2 + kx + 1$ for all x and f is an even function then find k

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59. Let $f: N \to N: f(x) = 2x, g: N \to N: g(y) = 3y + 4$

and $h: N \to N: h(z) =$ sin z

Show that h o (g o f) = (h o g) o f .

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60. Find gof and fog if $f(x) = |x|$ and $g(x) = |3 - 2x|$

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61. Find gof and fog if $f(x) = 8x^3$ and $g(x) = x^{\frac{1}{3}}$

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62. What is the maximum number of points in which a vertical line can meet the graph of real valued function?

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

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64. Write the range of the function $f(x) = -x^2, x \in R$

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65. Write the domain and range of the signum function,

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66. Is the function $f(x) = x^{3n}, n \in N$ even?

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67. Write the range of the function $f(x) = x^2 + 1, x \in R$

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68. Write the domain and range of the function $f(x) = [x]$

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69. If $f(x) = 4x - x^2$ then find f(a+1)-f(a-1)

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70. If A and B are finite sets with n(A) =3 and N(B)=6 then find $n(A \times B)$

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71. Is the function $f: R \to R$ be defined by f(x)=2x+3 a one on one function?

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72. Find the range of the function $f(x) = \frac{|x-a|}{x-a}$, x is not equal to a

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

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74. Find the range of the function $f(x) = -x^2 - 100$

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75. Is the function $f(x) = |x|$ one on one?

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76. Show that the function $f: R \to R$ defined by $f(x) = x^2$ is neither one-one nor onto.

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77. If R denotes the set of all real numbers, then the function $f: R \to R$ defined by $f(x) = [x]$ is

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78. A horizontal line meets the graph of the function y=f(x) in two points is f one one?

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79. If $t(C) = \frac{9C}{5} + 32$ write the value of t(28)

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80. Find the range of the function $f(x) = [x], 1 \leq x < 3$

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81. Find the total number of function from a set A to B where n(A)=3 and n(B)=4

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82. Find the period of the function f(x)=sin5x

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83. If (x+y,x-y)=(1,2) find x and y

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84. Find the domain and range of the following relation $R = \{(1, 3), (1, 5), (1, 7), (1, 9)\}$

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85. Find the domain and range of the following relation $R = \{(x, y) : x \in N, x < 6 \text{ and } y = 4\}$

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86. Find the domain and range of the following relation $R = \{(x + 2, x + 4) : x \in \{0, 1, 2, 3, 4, 5\}\}$

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87. which of the following relations are functions from A={1,3,5,7,9} to B={1,2,3,4,5} $f = \{(3, 2), (1, 5), (5, 1), (7, 4), (9, 5)\}$

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88. which of the following relations are functions from A={1,3,5,7,9} to B={1,2,3,4,5} $f = \{(1, 3), (3, 1), (5, 3), (5, 5), (1, 4)\}$

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89. If $f: R \to R$ defined by $f(x) = x^2 - 2x + 3$, then find $f(f(x))$.

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90. Find the domain and range of the following $f(x) = \frac{1}{2x - 1}$

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91. Find the domain and range of the following $f(x) = \dfrac{3}{2 - x^2}$

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92. Find the domain and range of the following $f(x) = 1 + 3\cos 2x$

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93. Find the domain and range of the following $f(x) = \dfrac{1}{x^2 - 1}$

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94. Find the domain and range of the following $f(x) = \dfrac{1}{\sqrt{1 - \cos x}}$

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95. Which of the following functions are even and which odd?

$f(x) = x^4 + x^2$

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96. Which of the following functions are even and which odd?

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

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97. which of the following functions are even and which odd?

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

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98. if $f(x) = \frac{1}{1-x}$ then find $f\left(\frac{x-1}{x}\right)$

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99. If $f : R \div R$ be defined by $f(x) = \left(3 - x^3\right)^{1/3}$, then find $fof(x)$

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100. If f and g are two functions defined by $f(x) = \sqrt{x+1}$ and $g(x) = \frac{1}{x}$ then find the following functions: f+g

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101. If f and g are two functions defined by $f(x) = \sqrt{x+1}$ and $g(x) = \frac{1}{x}$ then find the following functions: f-g

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102. If f and g are two functions defined by $f(x) = \sqrt{x+1}$ and $g(x) = \frac{1}{x}$ then find the following functions: fg

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103. If f and g are two functions defined by $f(x) = \sqrt{x+1}$ and $g(x) = \frac{1}{x}$ then find the following functions: $\frac{f}{g}$

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104. If f and g are two functions defined by $f(x) = \sqrt{x+1}$ and $g(x) = \frac{1}{x}$ then find the following functions: 2f-3g

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105. If f and g are two functions defined by $f(x) = \sqrt{x+1}$ and $g(x) = \frac{1}{x}$ then find the following functions: $2f^2 + \sqrt{2}g$

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106. Draw the graph of the following functions and hence find the range of $f(x) = 1 - x$

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107. Draw the graph of the following functions and hence find its ranges $f(x) = 2x^2$

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108. Draw the graph of the following functions and hence find its ranges :

f(x)=1-x

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109. Draw the graph of the following functions and hence find its ranges:

f(x)=$2x^3$

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110. Check the injectivity and surjectivity of the following functions $f: Z \to Z$ defined by $f(x) = x^2$

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111. Check the injectivity and surjectivity of the following functions $f: R \to R$ defined by f(x)=3x+10

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112. Check the injectivity and surjectivity of the following functions $f: R - \left\{\left(-\frac{4}{3}\right)\right. \to R$ defined by $f(x) = 4\frac{x}{3x+4}$

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113. Check the injectivity and surjectivity of the following functions $f: R \to [5, \infty)$ defined by $f(x) = 9x^2 + 6x - 5$

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114. If $f: R - \left\{\frac{2}{3}\right\} \to R$ defined by $f(x) = \frac{4x + 3}{6x - 4}$ show that $f(f(x)) = x$

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115. Show that the function $f: R \to R$ defined by $f(x) = x^4 + 5$ is neither one one nor onto

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