



MATHS

BOOKS - MAXIMUM PUBLICATION

Relations and Functions

Example

1. If $(x + 1, y - 2) = (3, 1)$, find the values of

x

and y.



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2. 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 .



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

$H \times G$.



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



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



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



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7. Let $f = \left\{ \left(x, \frac{x^2}{1 + x^2} \right), x \in R \right\}$ be a real function from R to R . Determine the domain and range of f .



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8. Graph the following real functions.

(each carries 2 scores)

$$f(x) = |x - 2|$$



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9. Graph the following real functions.

(each carries 2 scores)

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



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10. Graph the following real functions.

(each carries 2 scores)

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



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11. Graph the following real functions.

(each carries 2 scores)

$$f(x) = \frac{1}{x}$$



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12. Graph the following real functions.

(each carries 2 scores)

$$f(x) = (x - 1)^2$$



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13. Graph the following real functions.

(each carries 2 scores)

$$f(x) = 3x^2 - 1$$



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14. Graph the following real functions.

(each carries 2 scores)

$$f(x) = |x| - 2$$



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15. Consider the relation,

$$R = \{(x, 2x - 1) / x \in A\}$$

where

$$A = \{2, -1, 3\}$$

Write R in roster form.



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16. Consider the relation,

$$R = \{(x, 2x - 1) / x \in A\} \quad \text{where}$$

$$A = \{2, -1, 3\}$$

Write the range of R.



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17. Let $A = \{1, 2, 3, 4, 6\}$ and R be a relation

on A

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

divisible by a}

Write R in the roster form.



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18. Let $A = \{1, 2, 3, 4, 6\}$ and R be a relation on A

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

Find the domain and range of R.



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19. Consider the real function

$$f(x) = \frac{x^2 + 2x + 3}{x^2 - 8x + 12}$$

Find the value of x if $f(x) = 1$



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20. Consider the real function

$$f(x) = \frac{x^2 + 2x + 3}{x^2 - 8x + 12}$$

Find the domain of f .



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21. If $f(x) = x^3 + 5x$ and $g(x) = 2x + 1$, find $(f + g)(2)$ and $(fg)(1)$.



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22. Let $A = \{1, 2, 3, 4, 5\}$ and R be a relation on A

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

Write R in the roster form.



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23. Let $A = \{1, 2, 3, 4, 5\}$ and R be a relation on A

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

Find the range of R .



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24. Draw the graph of the function

$$f(x) = |x| + 1, x \in R$$



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25. Draw the graph of the function

$$f(x) = x^2, x \in R$$



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26. Let $A = \{1, 2, 3, 4, 6\}$. Let R be the relation on

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

Write R in roster form.



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27. Let $A = \{1, 2, 3, 4, 6\}$. Let R be the relation

on

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

exactly divisible by $a\}$

Find the domain of R .



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28. Let $A = \{1, 2, 3, 4, 6\}$. Let R be the relation

on

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

exactly divisible by a }

Find the range of R .



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29. Determine the domain and range of the relation R defined by

$$R = \{(x, x + 5) : x \in \{0, 1, 2, 3, 4, 5\}\}$$



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30. A function f is defined as $f(x) = 2x - 5$.

Write down the values of $f(0), f(7), f(-3)$.



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31. Find the range of the following functions.

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



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32. Find the range of the following functions.

$$f(x) = x^2 + 2, x \text{ is a real number.}$$



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33. Find the range of the following functions.

$$f(x) = x, x \text{ is a real number.}$$



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34. 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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35. Let $A = \{1, 2\}, B = \{1, 2, 3, 4\}, C = \{5, 6\}$

and

$D = \{5, 6, 7, 8\}$. Verify that

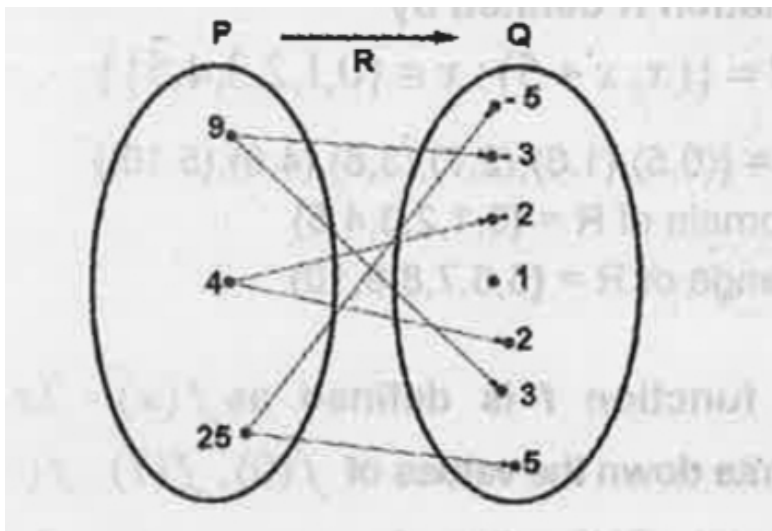
$A \times C$ is a subset of $B \times D$





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36. The arrow diagram given below shows a relation R from P to Q . Write the relation in roster form, set-builder form. Find its domain and range.



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37. Find the domain of the following.

$$f(x) = \frac{x^2 + 2x + 1}{x^2 - 8x + 12}$$



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38. Find the domain of the following.

$$f(x) = \frac{x^2 + 3x + 5}{x^2 - 5x + 4}$$



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39. 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 $\left(\frac{f}{g}\right)(x)$



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40. Let $f(x) = x^2$ and $g(x) = 2x + 1$ be two functions defined over the set of non-negative real numbers. Find $(f + g)(x)$, $(f - g)(x)$, $(fg)(x)$ and $\left(\frac{f}{g}\right)(x)$



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41. $A = \{1, 2\}, B = \{3, 4\}$

Write $A \times B$



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42. $A = \{1, 2\}, B = \{3, 4\}$

Write relation from A to B in roster form.



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43. $A = \{1, 2\}, B = \{3, 4\}$

Represent all possible functions from A to B (Arrow diagram may be used)



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44. Let $A = \{1, 2, 3\}, B = \{3, 4\}$ and $C = \{4, 5, 6\}$.

Find

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



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45. Let $A = \{1, 2, 3\}, B = \{3, 4\}$ and
 $C = \{4, 5, 6\}$.

Find

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



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46. Let $A = \{1, 2, 3\}, B = \{3, 4\}$ and
 $C = \{4, 5, 6\}$.

Find

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





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47. Let $A = \{1, 2, 3\}$, $B = \{3, 4\}$ and $C = \{4, 5, 6\}$.

Find

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



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48. Find the domain and range of the following functions.

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



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49. Find the domain and range of the following functions.

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



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50. Find the domain and range of the following functions.

$$f(x) = |x - 1|$$



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51. Find the domain and range of the following functions.

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



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52. Let $A = \{1, 2, 3, 4\}$ and $B = \{1, 4, 5\}$ be two sets.

If R is the relation " $<$ " from A to B then

Write R in Roster form.



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53. Let $A = \{1, 2, 3, 4\}$ and $B = \{1, 4, 5\}$ be two sets.

If R is the relation " $<$ " from A to B then

Write Domain and Range of R .



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54. Let $A = \{1, 2, 3, 4\}$ and $B = \{1, 4, 5\}$ be two sets.

If R is the relation "<" from A to B then

Find the number of relations from

A to B.



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55. If $\left(\frac{2x}{5} + 1, y - \frac{3}{4}\right) = \left(\frac{1}{5}, \frac{1}{4}\right)$ find x

and y.



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56.

If

$$f = \{(2, 5), (3, 1), (5, 2), (8, 5), (10, 2), (11, 5)\}$$

is a function, write its range.



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57. Let $A = \{1, 2, 3\}, B = \{3, 4\}$. Write a relation

from A and B having 5 elements. Write its domain, co-domain and range.



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58. The function f is defined by

$$f(x) = \begin{cases} 2 - x & x < 0 \\ 2 & x = 0 \\ 2 + x & x > 0 \end{cases}$$

Draw the graph of Find $f(x)$



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59. Let $A = \{1, 2, 3\}, B = \{4, 5\}$

Find $A \times B$ and $B \times A$



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60. Let $A = \{1, 2, 3\}, B = \{4, 5\}$

Find the number of relations from A to B.



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61. Let $A = \{7, 8\}$ and $B = \{2, 4, 5\}$. Find

$A \times B$



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62. Determine the domain and range of the relation R defined by $R = \{(x, y) : y = x + 1\}$, $x \in \{0, 1, 2, 3, 4, 5, 6\}$



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63. If $A = \{2, 4\}$, $B = \{1, 3, 5\}$. Then the number of relations from A to B is



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64. If $P = \{ -1, 1 \}$, form the set $P \times P \times P$.



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65. Consider the function $f: R \rightarrow R$ defined

$$\text{by } f(x) = -|x|$$

Find the domain and range of f .



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66. Consider the function $f: \mathbb{R} \rightarrow \mathbb{R}$ defined

$$\text{by } f(x) = -|x|$$

Draw the graph of f .



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67. Consider the functions

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

Find

Domain of 'f'.



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68. Consider the functions

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

Find

Domain of 'g'.



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69. Consider the functions

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

Find

$$(f + g)(x)$$



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70. Consider the functions

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

Find

$$(fg)(x)$$



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71. The Cartesian product $P \times P$ has 9 elements

among which are found $(-a, 0)$ and $(a, 0)$.

A relation from P to P is defined as

$$R = \{(x, y) : x + y = 0\}$$

Find P .



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72. The Cartesian product $P \times P$ has 9 elements

among which are found $(-a, 0)$ and $(a, 0)$.

A relation from P to P is defined as

$$R = \{(x, y) : x + y = 0\}$$

Depict the relation using an arrow diagram.



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73. The Cartesian product $P \times P$ has 9 elements

among which are found $(-a, 0)$ and $(a, 0)$.

A relation from P to P is defined as

$$R = \{(x, y) : x + y = 0\}$$

Write down the domain and range of R .



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74. The Cartesian product $P \times P$ has 9 elements

among which are found $(-a, 0)$ and $(a, 0)$.

A relation from P to P is defined as

$$R = \{(x, y) : x + y = 0\}$$

How many relations are possible from P to P?



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

Find the domain and range of the function.



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

Prove that $f(x)f(-x) + f(0) = 0$



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77. Let $P = \{1, 2\}$. Find $P \times P \times P$



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78. Let $A = \{1, 2, 3, \dots, 13, 14\}$, R is the relation on A defined by

$$R = \{(x, y) : 3x - y = 0, x, y \in A\}$$

Write R in a tabular form.



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79. Let $A = \{1, 2, 3, \dots, 13, 14\}$, R is the relation on A defined by

$$R = \{(x, y) : 3x - y = 0, x, y \in A\}$$

Find the domain and range of R .





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80. Write the domain and range of the relation

$$R = \{(2, 5), (3, 10), (4, 17), (5, 26)\}$$



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81. If $f(x) = x^2 - 3x$ and $g(x) = x + 2$ find $(f + g)(x)$, $(f - g)(x)$ and $(fg)(x)$



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82. If $P = \{m, n\}, Q = \{n, m\}$, state whether the following is TRUE or FALSE

$$P \times Q = \{(m, n), (n, m)\}$$



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



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84. Let $A = \{1, 2, 3, 4\}$
 $B = \{1, 5, 9, 11, 15, 16\}$ and
 $f = \{(1, 5), (2, 9), (3, 1), (4, 5), (2, 1)\}$. State
with the reason whether f is a relation or a
function.



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85. Let R be the set of Reals. Define a function

$$f: R \rightarrow R \text{ by } f(x) = 2x^2 - 1$$

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





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86. Let R be the set of Reals. Define a function

$$f: R \rightarrow R \text{ by } f(x) = 2x^2 - 1$$

Find $f[f(x)]$



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87. Let R be the set of Reals. Define a function

$$f: R \rightarrow R \text{ by } f(x) = 2x^2 - 1$$

Draw the graph of $f(x)$



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



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89. Consider the relation R defined by $R = \{(x, x + 1) : x \in \{-1, 1\}\}$ Write R in the roster form. Also find the range.



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90. Draw the graph of the function.

$$y = x, x \in R$$



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91. Let $A = \{1, 2, 3, 4, 5, 6\}$ be a set. Defined a relation R from A to A by

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

Express R in the roster form.



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92. Let $A = \{1, 2, 3, 4, 5, 6\}$ be a set. Defined a relation R from A to A by

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

Represent the relation R using an arrow diagram.



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93. Let $A = \{1, 2, 3, 4, 5, 6\}$ be a set. Defined a relation R from A to A by

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

Write the domain and range of R .



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94. Find the domain of the function

$$f(x) = \frac{x^2 + 3x + 5}{x^2 - 5x + 4}$$



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95. Sketch the graph of the function

$$f(x) = |x + 1|$$



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96. Match the following

 <p>1</p>	<p>Modulus function.</p> $f: \mathbb{R} \rightarrow \mathbb{R}; f(x) = x $
 <p>2</p>	<p>Signum function</p> $f: \mathbb{R} \rightarrow \mathbb{R}$ $f(x) = \begin{cases} x & x \neq 0 \\ x & x = 0 \end{cases}$
 <p>3</p>	<p>Identity function</p> $f: \mathbb{R} \rightarrow \mathbb{R}; f(x) = x$
	<p>Greatest integer function.</p> $f: \mathbb{R} \rightarrow \mathbb{R} f(x) = [x]$



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97. $A = \{1, 2, 3, \dots, 14\}$. R is a relation from A to A defined by $R = \{(x, y) : 3x - y = 0, x, y \in A\}$. Write the domain, range, co-domain of R .



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98. If $(x + 1, y - 2) = (3, 1)$, write the values of x and y .



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99. Let $A = \{1, 2, 3, 4, 5\}$ and $B = \{4, 6, 9\}$

be two sets. Define a relation R from A to B by

$R = \{(x, y) : x - y\}$ is a positive integer.



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100. Define the modulus function. What is

its domain? Draw a rough sketch.



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101. The domain of the function

$$f(x) = \frac{1}{x-1} \text{ is.....}$$

A. $\{1\}$

B. R

C. $R - \{1\}$

D. $R - \{0\}$

Answer: C



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102. A relation R on set natural numbers is defined by $R = \{(x, y) : y = x + 5, x \text{ is a natural number less than } 4, x, y \in \mathbb{N}\}$

Write the relation in roster form.



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103. A relation R on set natural numbers is defined by $R = \{(x, y) : y = x + 5, x \text{ is a natural number less than } 4, x, y \in \mathbb{N}\}$

Write the domain and range of the relation.



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104. Draw the graph of the relation

$$f(x) = |x|, x \in \mathbb{R}$$



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