MATHS

BOOKS - RD SHARMA MATHS (HINGLISH)

FUNCTIONS

Solved Examples And Exercises

1. If $f(x) = \frac{\cos^2 x + \sin^4 x}{\sin^2 x + \cos^4 x}$, for $x \in R$, then f(2002) is equal to

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2. The range of the function $f(x) = \frac{x^2 - x}{x^2 + 2x}$ is R (b) $R - [1]$ (c) $R = \left\{ -\frac{1}{2}, 1 \right\}$ (d) none of these

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3. If $f(x) = \cos(\log x)$, then value of $f(x)f(4) - \frac{1}{2}\left\{f\left(\frac{x}{4}\right) + f(4x)\right\}$ is (a) 1 (b) -1 (c) 0 (d) ± 1

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4. If $f(x) = \log\left(\frac{1+x}{1-x}\right)$ and then $f\left(\frac{2x}{1+x^2}\right)$ is equal to $\{f(x)\}^2$ (b) $\{f(x)\}^3$ (c) $2f(x)$ (d) $3f(x)$

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5. If $2f(x) - 3f\left(\frac{1}{x}\right) = x^2 (x \neq 0)$, then $f(2)$ is equal to (a)$-\frac{7}{4}$(b)$\frac{5}{2}$ (c) -1 (d) none of these

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6. If $f(x) = \frac{2^x + 2^{-x}}{2}$, then $f(x+y)f(x-y)$ is equals to (a) $\frac{1}{2}\{f(2x) + f(2y)\}$ (b) $\frac{1}{2}\{f(2x) - f(2y)\}$ (c) $\frac{1}{4}\{f(2x) + f(2y)\}$

$\frac{1}{4}\{f(2x) - f(2y)\}$

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7. Let $f(x) = \frac{\alpha x}{x+1}, x \neq -1$. Then write the value of α satisfying $f(f(x)) = x$ for all $x \neq -1$.

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8. Write the range of the function $f(x) = \sin[x], where \frac{-\pi}{4} \leq x \leq \frac{\pi}{4}$.

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9. If $f(x) = \log\left(\frac{1+x}{1-x}\right) and g(x) = \left(\frac{3x + x^3}{1 + 3x^2}\right)$, then $f(g(x))$ is equal to $f(3x)$ (b) $\{f(x)\}^3$ (c) $3f(x)$ (d) $-f(x)$

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

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11. Relation between graphs of a function and its inverse

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12. A be the set of two positive integers and $f: A \to Z^+$ (set of positive integer) defined as $f(n) = p$ where p is the largest prime factor of n. If the range of f is $\{3\}$, find A.

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13. Range of $f(x) = \frac{1}{1 - 2\cos x}$ is (1) $\left[\frac{1}{3}, 1\right]$ (2) $\left[-1, \frac{1}{3}\right]$ (3) $(-\infty, -1] \cup \left[\frac{1}{3}, \infty\right)$ (4) $\left[-\frac{1}{3}, 1\right]$

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

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15. Find the domain of each of the following real valued functions of real variable: $f(x) = \sqrt{x-2}$ (ii) $f(x) = \frac{1}{\sqrt{x^2-1}}$ (iii) $f(x) = \sqrt{9-x^2}$ (iv) $f(x) = \sqrt{\frac{x-2}{3-x}}$

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16. Examples :- If $x; y \in \{1; 2; 3; 4\}$;then which of the following are function in the given set ? `(a) f_1={(x;y):y=(x+1)} (b) f_2={(x;y):y4 (d) f_4= {(x;y):x+y=5}`

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

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18. Express the following functions as sets of ordered pairs and determine their ranges $f : A\vec{R}, f(x) = x^2 + 1$ where $A = \{-1, 0, 2, 4\}$. $g : A\vec{N}, g(x) = 2x$ where $A = \{x : x \in N, x \leq 10\}$.

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19. if for nonzero x, $af(x) + bf\left(\frac{1}{x}\right) = \frac{1}{x} - 5$, where $a \neq b$ then f(2) =

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20. If $f(x) = (a - x^n)^{\frac{1}{n}}, a > 0$ and $n \in N$, then prove that $f(f(x)) = x$ for all x.

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

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22. Find the domain and range of the function $f(x)$ given by $f(x) = \frac{x-2}{3-x}$.

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23. Find range of each of the following functions:

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

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25. Let $f: R\vec{R}$ be such that $f(x) = 2^x$. Determine: Range of f (ii) $\{x: f(x) = 1\}$ (iii) Whether $f(x + y) = f(x)f(y)$ holds.

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26. Let $f: R\vec{R}$ be given by $f(x) = x^2 + 3$. Find (i) $\{x: f(x) = 28\}$ (ii) the pre-images of 39 and 2 under f.

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

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28. If $[x]^2 - 5[x] + 6 = 0$, where [.] denotes the greatest integer function, then $x \in [3, 4]$ (b) $x \in (2, 3]$ (c) $x \in [2, 3]$ (d) $x \in [2, 4)$

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29. If f is a real valued function given by $f(x) = 27x^3 + \frac{1}{x^3} and \alpha, \beta$ are roots of $3x + \frac{1}{x} = 2$. Then, $f(\alpha) = f(\beta) = -9$ (b) $f(\alpha) = 10$ (c) $f(\beta) = -10$ (d) none of these

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30. If $3f(x) + 5f\left(\frac{1}{x}\right) = \frac{1}{x} - 3$ for all non-zero x, then $f(x) =$ (a) $\frac{1}{16}\left(\frac{3}{x} + 5x - 6\right)$ (b) $\frac{1}{16}\left(-\frac{3}{x} + 5x - 6\right)$ (c) $\frac{1}{16}\left(-\frac{3}{x} + 5x + 6\right)$

(d) none of these

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31. The function $f: R\vec{R}$ is defined by $f(x) = \cos^2 x + \sin^4 x\dot{T}hen, f(R) = [3/4, 1)$ (b) $(3/4, 1]$ (c) $[3/4, 1]$ (d) $(3/4, 1)$

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32. If $e^{f(x)} = \frac{10+x}{10-x}, x \in (-10, 10)$and $f(x) = kf\left(\frac{200x}{100+x^2}\right)$,t h e nk=$(a)0.5(b)$0. 6` (c) 0.7 (d) 0.8

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33. The domain of definition of $f(x) = \sqrt{\frac{x+3}{(2-x)(x-5)}}$ is $(-\infty, -3] \cup (2, 5)$ (b) $(-\infty, -3) \cup (2, 5)$ (c) $(-\infty, -3] \cup [2, 5]$ (d) none of these

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34. The range of the function $f(x) = \sqrt{5|x|^{-2} - 6}$ is

$a.\ (-3, -2) \cup (2, 3)$ b. $[-3, -2) \cup [2, 3)$ c. $[-3, -2] \cup [2, 3]$ d. none of these

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35. If $f: R\overrightarrow{R}$ 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) $f(x) + f(x - 1) = 1$

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36. If $f(x) = \sin[\pi^2]x + \sin[-\pi^2]x$, where $[x]$ denotes the greatest integer less than or equal to

A. $f(\pi/2) = 1$

B. $f(\pi) = 2$

C. $f(\pi/4) = -1$

D. none of these

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

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38. If $y = f(x) = \frac{ax-b}{bx-a}$, show that $x = f(y)$.

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39. If $f(x) = \frac{x-1}{x+1}, x \neq -1,$. then show that $f(f(x)) = -\frac{1}{x}$, prove that $x \neq 0$.

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40. Express the function $f: X \overrightarrow{R}$ given by $f(x) = x^3 + 1$ as set of ordered pairs, where $X = \{-1, 0, 3, 9, 7\}$.

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

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42. Let $f: R \overrightarrow{R} and g: C \overrightarrow{C}$ be two functions defined as $f(x) = x^2 and g(x) = x^2$. Are they equal functions?

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43. Let $A = \{12, 13, 14, 15, 16, 17\} and f: A \overrightarrow{Z}$ be function given by $f(x) =$ highest prime factor of x. Find range of f.

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

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45. Find the domain of definition of the following $f(x)$ given by $f(x) = \log_4\{(\log_5 \log_3(18x - x^2 - 77)\}$

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

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47. Find the range of each of the following functions: $f(x) = |x - 3|$

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

$f(x) = \frac{|x - 4|}{x - 4}$

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48. Find the sum and product of identity function and the modulus function.

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49. If $f(x) = \frac{1}{1 - x}$, show that $f[f\{f(x)\}] = x$.

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50. If $f(x) = x^3 - \frac{1}{x^3}$, show that $f(x) + f\left(\frac{1}{x}\right) = 0$.

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

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52. If f is a real function satisfying $f\left(x+\frac{1}{x}\right) = x^2 + \frac{1}{x^2}$ for all $x \in R - \{0\}$, then write the expression for $f(x)$.

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53. Let f be a relation on the set $\mathbb{N}$ of natural numbers defined by $f = \{(n, 3n) : n \in \mathbb{N}\}$ is f a function from $\mathbb{N} \to \mathbb{N}$. If so, find the range of f.

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54. Let f be the subset of $Z \times Z$ defined by $f = \{(ab, a + b) : a, b \in Z\}$. Is f a function from Z to Z? Justify your answer.

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55. Consider a rule $f(x) = 2x - 3$ associating elements of $\mathbb{N}$ (set of natural numbers) to elements of $\mathbb{N}$. Is it a function?

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56. Let $A = \{-2, -1, 0, 1, 2\} and\ f: A \to \mathbb{Z}$ be given y $f(x) = x^2 - 2x - 3$. Find: i. the range of f ii. pre images of $6, -3$ and 5.

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57. Let $A = \{1, 2\}, B = \{3, 6\}$ and $f: A \to B$ given by $f(x) = x^2 + 2$ and $g: A \to B$ given by $g(x) = 3x$. Verify $f = g$.

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58. Let $f: R - \{2\} \to R$ be defined as f(x) = $\frac{x^2 - 4}{x - 2}$ and $g: R \to R$ be defined by g(x) = x + 2. Find whether f = g or not.

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59. Let $f: \mathbb{Z} \to \mathbb{Z}$ *and* $g: \mathbb{Z} \to \mathbb{Z}$ be functions defined by $f = \{(n, n^2): n \in \mathbb{Z}\}$ and $g = \left\{\left(n, |n|^2\right): n \in \mathbb{Z}\right\}$. Show that. $f = g$.

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60. Let $f: R \to R$ be a function given by $f(x) = x^2 + 1$. Find: $f^{-1}\{-5\}$

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

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62. If $f: \mathbb{R} \to \mathbb{R}$ be defined as follows: $f(x) = \{1, \text{ if } x \in \mathbb{Q}, -1, \text{ if } x \notin \mathbb{Q}$ Find: $f(1/2), f(\pi), f(\sqrt{2})$

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63. If $f: R \to R$ be defined as follows: $f(x) = \{1, \text{ if } x \in Q - 1, \text{ if } x \notin Q$ Find: range of f.

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64. Find domain and range of function Let $A = \{-2; -1; 0; 1; 2\}$ and $f: A \to Z$ be given by $f(x) = x^2 - 2x - 3)$ (a)find the range of f (b) find preimages of 6;-3 and 5

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65. Let $A = \{-2, -1, 0, 1, 2\} and\ f: A \to Z$ be given y $f(x) = x^2 - 2x - 3$. Find: i. the range of f ii. pre images of 6,-3 and 5.

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66. If a function $f: R \to R$ be defined by $f(x) = \{3x - 2, x < 01, x = 04x + 1, x > 0$ Find: $f(10, f(-1), f(0), f(2)\cdot$

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67. Let $f: R \to R$ whre R^+ is the set of all positive real numbers, be such that $f(x) = (\log)_e x$. Determine: $\{x: f(x) = -2\}$

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68. Let $f: R \to R$ whre R^+ is the set of all positive real numbers, be such that $f(x) = (\log)_e x$. Determine: whether $f(xy) = f(x) + f(y)$ holds.

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69. Write the following relations as sets of ordered pairs and find which of them are function : $\{(x, y): x + y = 3, x, y \in \{0, 1, 2, 3\}\}$

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70. If f, g, h are three functions defined from $R \to R$ as follows: Find the range of $f(x) = x^2$

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71. If f, g, h are three functions defined from $R \to R$ as follows: the range of $h(x) = x^2 + 1$

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72. 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 y

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73. If $f: R \to R$ be defined by $f(x) = x^2 + 1$, then find $f^{-1}(17)$ and $f^{-1}(-3)$.

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74. If $A = \{p, q, r, s\}$ and $B = \{1, 2, 3\}$, find which of the following is not a function from A to B?

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75. If $A = \{p, q, r, s\}$ and $B = \{1, 2, 3\}$, find which of the following is not a function from A to B?

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76. If $A = \{p, q, r, s\}$ and $B = \{1, 2, 3\}$, find which of the following is not a function from A to B?

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77. If $A = \{p, q, r, s\}$ and $B = \{1, 2, 3\}$, find which of the following is not a function from A to B?

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

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79. The relation f is defined by $f(x) = \{x^2, 0 \leq x \leq 33x, 3 \leq x \leq 10$ The relating g is defined by $g(x) = \{x^2, 0 \leq x \leq 33x, 2 \leq x \leq 10$Show that f is a function and g is not a function.

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

A. 2

B. 2.1

C. 1.9

D. 0.1

Answer: B

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81. If $f(x) = 3x^4 - 5x^2 + 9$, find $f(x-1)$.

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82. 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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83. If $f(x) = x^2 - 3x + 4$, then find the values of x satisfying the equation $f(x) = f(2x+1)$.

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

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85. If $f(x) = \begin{cases} x^2, & when\ x < 0 \\ x, & when\ 0 \leq x < 1 \\ \frac{1}{x}, & when\ x > 1 \end{cases}$

Find: i. $f(1/2)$ ii. $f(-2)$ iii. $f(1)$ iv. $f(\sqrt{3})$ v. $f(-\sqrt{3})$

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86. If $f(x) = \frac{2x}{1+x^2}$, show that $f(\tan\theta) = \sin 2\theta)$

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87. Find the domain of each of the following real valued function:

$f(x) = \frac{1}{x-7}$

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88. Find the domain of each of the following real valued function:

$$f(x) = \frac{x-1}{x-3}$$

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89. Find the domain of each of the following real valued function:

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

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90. Find the domain of each of the following real valued function:

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

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

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92. The range of the function $f(x) = \frac{x^2-9}{x-3}; x \neq 3$ is

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93. The domain and range of the real function f defined by $f(x) = \frac{4-x}{x-4}$ is

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94. The range of the function $f(x) = |x-1|$ is

A. $(-\infty, 0)$

B. $[0, \infty)$

C. $(0, \infty)$

D. R

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

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96. Find the domain of each of the following real valued functions of real variable: $f(x) = \frac{1}{x}$

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97. Find the domain of each of the following real valued functions of real variable: $f(x) = \frac{1}{x-7}$

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98. Find the domain of each of the following real valued functions of real variable: $f(x) = \frac{3x - 2}{x + 1}$

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99. Find the domain of each of the following real valued functions of real variable: $f(x) = \frac{2x + 1}{x^2 - 9}$

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

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101. Find the domain and range of each of the following real valued function: $f(x) = \frac{ax + b}{bx - a}$.

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102. Find the domain and range of each of the following real valued function: $f(x) = \frac{ax - b}{cx - d}$.

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

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104. Find the domain and range of each of the following real valued function: $f(x) = \sqrt{x-3}$.

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

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106. Find the domain and range of each of the following real valued function: $f(x) = \frac{x - 2}{2 - x}$.

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107. Find the domain and range of the following real functions:(i) $f(x) = -|x|$

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108. Find the domain and range of the following real functions:(i) $f(x) = -|x|$

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109. Find the sum and difference of the identity function and the modulus function.

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110. What are the sum and difference of the identity function and the reciprocal function ?

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111. Let $f \, and \, g$ be real functions define by $f(x) = x + 2$ and $g(x) = 4 - x^2$. Then, find each of the following function: $f + g$

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112. Let $f\ and\ g$ be real functions define by $f(x) = x + 2$ and $g(x) = 4 - x^2$. Then, find each of the following function: $f - g$

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113. Let $f\ and\ g$ be real functions define by $f(x) = x + 2$ and $g(x) = 4 - x^2$. Then, find each of the following function: $\frac{f}{g}$

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114. Let $f\ and\ g$ be real functions define by $f(x) = x + 2$ and $g(x) = 4 - x^2$. Then, find each of the following function: $f \cdot g$

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115. Find the domain and range of each of the following functions given by $f(x) = 1 - |x - 3|$

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116. Find the domain and range of the function given by $f(x) = \frac{1}{\sqrt{x - [x]}}$

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117. Find the domain and range of each of the following functions given by $f(x) = 1 - |x - 3|$

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

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119. Let $f(x) = 2x$ +5 and $g(x) = x^2 + x$. Describe i. $f + g$ ii. $f - g$ iii. fg iv. f/g. Find the domain in each case.

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

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

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

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

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

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

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

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127. If f, g, h are real functions defined by $f = \sqrt{x+1}$, $g(x) = \frac{1}{x}$ and $h(x) = 2x^2 - 3$, then find the values of $(2fg + g - h)(1)$ and $(2f + g - h)(1)$.

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

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129. Le $f: [0, \infty) \rightarrow R$ *and* $g: R \rightarrow R$ be defined by $f(x) = \sqrt{x}$ and $g(x) = x$. Find $f + g$, $f - g$, fg *and* $\frac{f}{g}$.

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

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131. Write the range of the real function $f(x) = |x|$.

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132. If $f(x) = 1 - \frac{1}{x}$ then write the value of $f\left(f\left(\frac{1}{x}\right)\right)$.

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133. If $f(x) = 4x - x^2, x \in R,$ then write the value of $f(a+1) - f(a-1)$.

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134. If $f,\ g,\ h$ are real functions given by $f(x) = x^2, g\,(x) = \tan x\ and\ h(x) = \log,\ x,\ then$ write the value of $(hog\ of)\left(\sqrt{\frac{\pi}{4}}\right)$.

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135. Write the domain and range of function $f(x)$ given by $f(x) = \frac{1}{\sqrt{x - [x]}}$

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136. Write of the domain and range of $f(x) = \sqrt{x - [x]}$.

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137. Write the domain and range of function $f(x)$ given by $f(x) = \sqrt{[x] - x}$.

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138. Let A and B be any two sets such that n(B)=P, n(A)=q then the total number of functions f:$A \to B$ is equal to

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

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140. If $f(x) = \cos\left((\log)_e x\right), then f(x)f(y) - \frac{1}{2}\left[f\left(\frac{x}{y}\right) + f(xy)\right]$ has value (a) -1 (b) $\frac{1}{2}$ (c) -2 (d) none of these

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141. Let $f(x) = |x - 1|$. Then (a) $f\left(x^2\right) = \left(f(x)\right)^2$ (b) $f(x + y) = f(x) + f(y)$ (c) $f(|x|) = |f(x)|$ (d) none of these

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142. If $A = \{1, 2, 3\},\ B = \{x, y\}$, then the number of functions that can be defined from A into B is 12 b. 8 c. 6 d. 3

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143. If $x \neq 1\ and\ f(x) = \frac{x+1}{x-1}$ is a real function, then $f(f(f(2)))$ is (a) 1 (b) 2 (c) 3 (d) 4

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144. If $f: R \to R: x \neq 0,\ -4 \leq x \leq 4$ and $f: A \to A$ be defined by $f(x) = \frac{|x|}{x}$ for $x \in A$. Then A is $\{1, -1\}$ b. $\{x: 0 \leq x \leq 4\}$ c. $\{1\}$ d. $\{x: -4 \leq x \leq 0\}$

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145. If $f: R \to R$ and $g: R \to R$ are defined by $f(x) = 2x + 3 and g(x) = x^2 + 7,$ then the value of x such that $g(f(x)) = 8\,1, 2 - 1, 2 - 1, \ -2\,1, \ -2$

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146. If $f: [-2, 2] \to R$ is defined by $f(x) = \{-1, \text{for} -2 \leq x \leq 0$, then $x - 1, \text{for} 0 \leq x \leq 2\, [x \in [-2, 2] : x \leq 0$ and $f(|x|) = x\} =$

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147. If $f(x) = 64x^3 + \frac{1}{x^3}$ and α, β are the roots of $4x + \frac{1}{x} = 3$. Then, $f(\alpha) = f(\beta)$

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

$[-\sqrt{3}, \sqrt{3}]$ b. $[-1-\sqrt{3}, -1+\sqrt{3}]$ c. $[-2, 2]$ d. $[-2-\sqrt{3}, -2+\sqrt{3}]$

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149. The domain of the function $f(x) = \sqrt{\frac{(x+1)(x-3)}{x-2}}$ is

$[-1, 2) \cup [3, \infty)$ b. $(-\infty, -3) \cup (2, 5)$ c. $(-\infty, -3] \cup [2, 5]$ d. none of these

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150. The domain of the function $f(x) = \sqrt{\frac{(x+1)(x-3)}{x-2}}$ is

$[-1, 2) \cup [3, \infty)$ b. $(-1, 2) \cup [3, \infty)$ c. $[-1, 2] \cup [3, \infty)$ d. none of these

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151. The domain of definition of the function $f(x) = \sqrt{x-1} + \sqrt{3-x}$ is $[1, \infty)$ b. $(-\infty, 3)$ c. $(1, 3)$ d. $[1, 3]$

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152. The domain of definition of the function $f(x) = \sqrt{\frac{x-2}{x+2}} + \sqrt{\frac{1-x}{1+x}}$ is $(-\infty, -2] \cup [2, \infty)$ b. $[-1, 1]$ c. φ d. none of these

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153. The domain of definition of the function $f(x) = \log|x|$ is R b. $(-\infty, 0)$ c. $(0, \infty)$ d. $R - \{0\}$

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154. The domain of definition of $f(x) = \sqrt{x - 3 - 2\sqrt{x - 4}} - \sqrt{x - 3 + 2\sqrt{x - 4}}$ is $[4, \infty)$ b. $(-\infty, 4]$ c. $(4, \infty)$ d. $(-\infty, 4)$

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155. The domain of the function $f(x) = \sqrt{5|x| - x^2 - 6}$ is (a) $(-3, -2) \cup (2, 3)$ b. $[-3, -2) \cup [2, 3)$ c. $[-3, -2] \cup [2, 3]$ d. none of these

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156. The range of the function $f(x) = \frac{x + 2}{|x + 2|}$, $x \neq -2$

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

B. $\{-1, 0, 1\}$

C. $\{1\}$

D. $(0, \infty)$

Answer: A

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157. The range of the function $f(x) = \frac{x}{|x|}$ is

$R - \{0\}$ b. $R - \{-1, 1\}$ c. $\{-1, 1\}$ d. none of these

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Others

1. Let f be the exponential function and g be the logarithmic function, Find: $(f + g)(1)$ (ii) $(fg)(1)$ (iii) 3f(1) (iv) 5g(1)

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2. Let $f: R \to R$ be a function given by $f(x) = x^2 + 1$. Find: $f^{-1}\{5\}$

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3. Let $f: R \to R$ be a function given by $f(x) = x^2 + 1$. Find: $f^{-1}\{10, 37\}$

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4. Define a function as a set of ordered pairs.

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5. Define a function as a correspondence between two sets.

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6. A function $f: R \to R$ is defined by $f(x) = x^2$. Determine Range of f

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7. Let $f: R \to R$ whre R^+ is the set of all positive real numbers, be such that $f(x) = (\log)_e x$. Determine: the image set of the domain of f

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8. Write the following relations as sets of ordered pairs and find which of them are function : $\{(x, y): y = 3x,\ x \in \{1, 2, 3\},\ y \in \{3, 6, 9, 12\}\}$.

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9. Write the following relations as sets of ordered pairs and find which of them are function : $\{(x, y): y > x + 1, x = 1, 2\ and\ y = 2, 4, 6\}$

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10. Let $X = \{1, 2, 3, 4\} and\, Y = \{1, 5, 9, 11, 15, 16\}$ Determine which of the following sets are functions from $X \to Y$

$f_1 = \{(1, 1),\ (2, 11),\ (3, 1),\ (4, 15)\}$

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11. Let $X = \{1, 2, 3, 4\} and\, Y = \{1, 5, 9, 11, 15, 16\}$ Determine which of the following sets are functions from $X \to Y$

$f_2 = \{(1, 1),\ (2, 7),\ (3, 5)\}$ and

$f_3 = \{(1, 5), (2, 9), (3, 1), (4, 5), (2, 11)\}$

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12. Find the quotient of the identity function by the modulus function.

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13. Find the product of the identity function and the reciprocal function.

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14. Find the quotient of the identity function by the reciprocal function.

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15. Find the domain and range of each of the following functions given by

$$f(x) = \frac{1}{x - [x]}$$

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16. Find the $f + g,\ f - g,\ cf(c \in R,\ c \neq 0),\ fg,\ \frac{1}{f} and \frac{f}{g}$ in each of the following: $f(x) = \sqrt{x - 1} and\ g(x) = \sqrt{x + 1}$

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17. Let f, g be two real functions defined by $f(x) = \sqrt{x+1}\, and\, g(x) = \sqrt{9-x^2}$. Then describe each of the following function: $\frac{5}{8}$

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18. If $f(x) = (\log)_e(1-x) and\, g(x) = [x]$, then determine each of the following function :$f+g$

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19. If $f(x) = (\log)_e(1-x) and\, g(x) = [x]$, then determine each of the following function :fg

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20. If $f(x) = (\log)_e(1-x) and\, g(x) = [x]$, then determine each of the following function : $\frac{f}{g}$

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21. If $f(x) = (\log)_e(1-x) and\, g(x) = [x]$, then determine each of the following function : $\frac{g}{f}$

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22. f and g are two real valued functioned. f=ln(1-x) and g=[x] .Find $(f+g)(-1),\ (fg)(0),\ \left(\frac{f}{g}\right)\left(\frac{1}{2}\right),\ \left(\frac{g}{f}\right)\left(\frac{1}{2}\right)$.

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23. Writhe the range of the function f(x)=cos[x], where $-\frac{\pi}{2} < x < \frac{\pi}{2}$

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24. Write the range of the function $f(x) = e^{x - [x]},\ x \in R$.

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25. Write the domain and range of the function $f(x) = \frac{x - 2}{2 - x}$.

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26. Let $f\ and\ g$ be two functions given by $f = \{(2, 4),\ (5, 6),\ (8,\ -1),\ (10,\ -3)\} and\ g = \{(2, 5),\ (7, 1), (8, 4), (10$

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27. Let $f\ and\ g$ be two real function given by $f = \{(0, 1),\ (2, 0),\ (3,\ -4),\ (4, 2),\ (5, 1) and\ g = \{(1, 0),\ (2, 2),\ (3,\ -1$

Find the domain of fg.

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28. Let $A = [1, 2, 3]$, $B = [2, 3, 4]$, then which of the following is a function from $A \to B$? $[(1, 2), (1, 3), (2, 3), (3, 3)]$ b. $\{(1, 3), (2, 4)\}$ c. $\{(1, 3), (2, 2), (3, 3)\}$ d. $\{(1, 2), (2, 3), (3, 2), (3, 4)\}$

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29. If $f: Q \to Q$ is defined as $f(x) = x^2$, *then* $f^{-1}(9)$ is equal to 3 b. -3 c. φ d. $\{-3, 3\}$

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30. Which one of the following is not a function? $\{(x, y): x, y \in R, x^2 = y\}$ b. $\{(x, y): x, y \in R, y^2 = x\}$ c. $\{(x, y): x, y \in R, x = y^3\}$ d. $\{(x, y): x, y \in R, y = x^3\}$

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