MATHS

BOOKS - RD SHARMA MATHS (HINGLISH)

FUNCTION

Solved Examples And Exercises

1. Find $gofandfog$ wehn $f: R\overrightarrow{R}$ and $g: R\overrightarrow{R}$ are defined by $f(x) = 2x + 3$ and$g(x) = x^2 + 5$ $f(x) = 2x + x^2$ and $g(x) = x^3$ $f(x) = x^2 + 8$ and $g(x) = 3x^3 + 1$ $f(x) = 8x^3$ and $g(x) = x^{1/3}$

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2. Let $f = \{(1, -1), (4, -2), (9, -3), (16, 4)\}$ and $g = \{(-1, -2), (02, -4), (-3, -6), (4, 8)\}$. Show that gof is defined while fog is not defined. Also, find gof.

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3. Show that if $f_1 and f_1$ are one-one maps from $R \rightarrow R$, then the product $f_1 x f_2 : R \vec{R}$ defined by $(f_1 x f_2)(x) = f_1(x) f_2(x)$ need not be one-one.

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4. Give examples of two surjective function $f_1 and f_2$ from $Z \rightarrow Z$ such that $f_1 + f_2$ is not surjective.

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5. Given examples of two one-one functions $f_1 and f_2$ from R to R such that $f_1 + f_2 : R \vec{R}$, defined by $(f_1 + f_2)(x) = f_1(x) + f_2(x)$ is not one-one.

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6. If $f: A \to B$ and $g: B \to C$ are onto functions show that gof is an onto function.

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7. Show that the logarithmic function $f: R0 + \overrightarrow{R}$ given by $f(x) = (\log)_a x, a > 0$ is bijection.

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8. If $f: A\overrightarrow{B} andg: B\overrightarrow{C}$ are one-one functions, show that gof is one-one function.

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9. If $f:R\vec{R}$ be the function defined by $f(x)=4x^3+7,$ show that f is a bijection.

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10. Let $A=\{1,2,3\}\cdot$ Write all one-one from A to itself.

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11. Show that $f:R\vec{R},$ given by $f(x)=x-[x],$ is neither one-one nor onto.

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12. Suppose $f_1 and f_2$ are non=zero one-one functions from $R\rightarrow R\cdot$ is $\frac{f_1}{f_2}$ necessarily one-one? Justify your answer. Here, $\frac{f_1}{f_2}:R\vec{R}$ is given by $\left(\frac{f_1}{f_2}\right)(x)=\frac{f_1(x)}{f_2(x)}$ for all $xR\cdot$

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13. Let $f = \{(3,\ 1),\ (9,\ 3),\ (12,\ 4)\}$ and $= \{(1,\ 3),\ (3,\ 3),\ (4,\ 9),\ (5,\ 9)\}$. Show that gof and fog are both defined. Also, find fog and gof.

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14. Find $fog(2)$ and $gof(1)$ when: $f: R \to R; f(x) = x^2 + 8$ and $g: R \to R; g(x) = 3x^3 + 1.$

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15. Let $f: \overrightarrow{RR}$ and $g: \overrightarrow{RR}$ be defined by $f(x) = x^2$ and $g(x) = x + 1.$ Show that $fog \neq gof$.

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16. Let R^{+} be the set of all non-negative real numbers. if $f: R^{+} \rightarrow R^{+}$ and $g: R^{+} \rightarrow R^{+}$ are defined as $f(x) = x^{2}$ and $g(x) = +\sqrt{x}$. Find fog and gof. Are they equal functions.

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17. Verify assoiativity for the following three mappings : $f: N\overrightarrow{Z}_0$ (the set of non zero integers), $g: Z_0\overrightarrow{Z}$ and $h: Q\overrightarrow{R}$ given by $f(x) = 2x$, $g(x) = \frac{1}{x}$ and $h(x) = e^{x}$.

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18. Let $f: R \rightarrow R$ and $g: R \rightarrow R$ be defined by $f(x) = x + 1$ and $g(x) = x - 1$. Show that $fog = gof = I_R$.

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19. Show that the exponential function $f\colon R\vec{R}$, given by $f(x) = e^x$, is one-one but not onto. What happens if the co-domain is replaced by R_0^+ (set of all positive real numbers).

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20. Let $A = \{-1, 0, 1)andf = \{(x, x^2) : xA\}$. Show that $f\colon A\vec{A}$ is neither one-one nor onto.

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21. If $f\colon A\vec{B}$ is an injection such that range of $f = \{a\}$. Determine the number of elements in A.

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22. Which of the following functions from $A \rightarrow B$ are one-one and onto?

$f_1 = \{(1, 3), (2, 5), (3, 7)\}; A = \{1, 2, 3\}, B = \{3, 5, 7\}$

$f_2 = \{(2, a), (3, b), (4, c)\}; A = \{2, 3, 4\}, B = \{a, b, c\}$

$f_3 = \{(a, x), (b, x), (c, z), (d, z)\}; A = \{a, b, c, d\}, B = \{x, y, z\}$

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23. Prove that the function $F: N\overrightarrow{N}$, defined by $f(x) = x^2 + x + 1$ is one-one but not onto.

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24. Let A be any non-empty set. Then, prove that the identity function on set A is a bijection.

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25. Let $A = R - [2] and B = R - [1]$. If $f : \overrightarrow{AB}$ is a mapping defined by $f(x) = \dfrac{x-1}{x-2}$, show that f is bijective.

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26. Show that if $f_1 and f_1$ are one-one maps from $R \rightarrow R$, then the product $f_1 x f_2 : R\overrightarrow{R}$ defined by $(f_1 x f_2)(x) = f_1(x) f_2(x)$ need not be one-one.

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27. Given examples of two one-one functions $f_1 and f_2$ from R to R such that $f_1 + f_2 : R\overrightarrow{R}$, defined by $(f_1 + f_2)(x) = f_1(x) + f_2(x)$ is not one-one.

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28. If $f, g: R\overrightarrow{R}$ are defined respectively by $f(x) = x^2 + 3x + 1, g(x) = 2x - 3,$ find fog (ii) gof (iii) fof (iv) gog.

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29. If the function $f: R\overrightarrow{R}$ be given by $f(x) = x^2 + 2andg: R\overrightarrow{R}$ be given by $g(x) = \frac{x}{x-1}$. Find $fogandgof.$

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30. If the function $fandg$ are given by $f = \{(1, 2), (3, 5), (4, 1)\}andg = ((2, 3), (5, 1), (1, 3)\},$ find range of $fandg$. Also, write down $fogandgof$ as sets of ordered pairs.

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31. Suppose $f_1 and f_2$ are non=zero one-one functions from $R \rightarrow R$. is $\frac{f_1}{f_2}$ necessarily one-one? Justify your answer. Here, $\frac{f_1}{f_2} : R\vec{R}$ is given by $\left(\frac{f_1}{f_2}\right)(x) = \frac{f_1(x)}{f_2(x)}$ for all xR.

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32. Find whether the following functions are one-one or not:

$f : R\vec{g} ivenbyf(x) = x^3 + 2f \text{ or } allx \in R$.

$f : Z\vec{Z} givenbyf(x) = x^2 + 1f \text{ or } allx \in Z$.

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33. If the function f and g are given by $f = \{(1, 2), (3, 5), (4, 1)\}$ and $g = \{(2, 3), (5, 1), (1, 3)\}$, find range of f and g. Also write down fog and gof as set of ordered pairs.

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34. Discuss the surjectivity of the following functions: $f: R \rightarrow$ given by $f(x) = x^3 + 2$for all $x \in R$.

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35. Show that the function $f: Z\overrightarrow{Z}$ defined by $f(x) = x^2 + x$ for all $x \in Z$, is a many one function.

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36. Let A be the set of all 50 students of class XII in a central school. Let $f: A\overrightarrow{N}$ be a function defined by $f(x) = Rol \ln umberofstudentx$ Show that f is one-one but not onto

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37. Show that the function $f: R\overrightarrow{R}$ defined by $f(x) = 3x^3 + 5$ for all $x \in R$ is a bijection.

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38. Show that the function $f: R\overrightarrow{R}$ given by $f(x) = \cos x f \text{ or } all x \in R,$

is neither one-one nor onto

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39. Show that the function $f: R^{\rightarrow}$ given by $f(x) = xa + b,$ where $a, b \in R, a \neq 0$ is a bijection.

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40. If $f(x) = \dfrac{x}{\sqrt{1 + x^2}}$ then $fofof(x)$

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41. If $f(x) = \dfrac{3x - 2}{2x - 3}$, prove that $f(f(x)) = x$ for all $x \in R - \left\{\dfrac{3}{2}\right\}$.

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42. Show that $f: R\overrightarrow{R}$, given by $f(x) = x - [x]$, is neither one-one nor onto.

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43. Let $f: R\overrightarrow{R}$ be a function given by $f(x) = ax + b$ for all $x \in R$. Find the constants a and b such that $fof = I_R$.

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44. If $f(x) = e^x$ and $g(x) = (\log)_e x (x > 0)$, find $fogandgof$. Is $fog = gof$?

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45. Let

$f : R \to R$ and $g : R \to Rdef \in edbyf(x) = x2$ and $g(x) = (x + 1)$.

Show that $gof \quad = fog$.

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46. Let f and g be real functions defined by

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

Then$(fog)^{-1}(x) = (1)x(2)2x(3)3x(4)4x$

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47. If $f(x) = \sqrt{x}(x > 0)$ and $g(x) = x^2 - 1$ are two real functions, find

fog and gof is $fog = gof$?

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48. Let $f: N - [1]\overrightarrow{N}$ be defined by, $f(x) =$ the highest prime factor of n .

Show that f is neither one-one nor onto. Find the range of f.

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49. If $f: R^{\rightarrow}$ is defined by $f(x) = 3x - 5$ Prove that f is a bijection. Also, find the inverse of f.

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50. If $f: \left(-\frac{\pi}{2}, \frac{\pi}{2}\right) \rightarrow R$ and $g: [-1, 1] \rightarrow R$ be defined as $f(x) = \tan x$ and $g(x) = \sqrt{1 - x^2}$ respectively. Describe fog and gof

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51. If

$f(x) = \sin^2 x + \sin^2\left(x + \frac{\pi}{3}\right) + \cos x \cos\left(x + \frac{\pi}{3}\right) and g\left(\frac{5}{4}\right) = 1,$

then $(gof)(x)$ is ________

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52. Let $f, g: R\vec{R}$ be a two function defined as $f(x) = |x| + x$ and $g(x) = |x| - x$ for all $x \in R$. Then, find fog and gof

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53. Let $A = \{a, b, c, d\}$ and $f: A \rightarrow A$ be given by $f = \{(a, b), (b, d), (c, a), (d, c)\}$, write f^{-1}

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54. Let $f = \{(3, 1), (9, 3), (12, 4)\}$ and $g = \{(1, 3), (3, 3), (4, 9), (5, 9)\}$. Show that $gofandfog$ are both defined. Also, find $fogandgof$.

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55. If $F : [1, \infty)\overrightarrow{2, \infty}$ is given by $f(x) = x + \frac{1}{x}, thenf^{-1}(x)$ equals. $\frac{x + \sqrt{x^2 - 4}}{2}$ (b) $\frac{x}{1 + x^2}$ (c) $\frac{x - \sqrt{x^2 - 4}}{2}$ (d)$1 + \sqrt{x^2 - 4}$

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56. Let $f : R \to R$ and $g : R \to R$ be two functions such that $fog(x) = \sin x^2 andgof(x) = \sin^2 x$ Then, find $f(x)andg(x)$.

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57. Let R be the set of real numbes. If $f : \overrightarrow{RR}; f(x) = x^2$ and $g : \overrightarrow{RR}; g(x) = 2x + 1$. Then, find $fogandgof$. Also, show that $fog \neq gof$.

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58. If $f(x) = -4-(x-7)^3$, write $f^{-1}(x)$.

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59. If $f:\{5,6\}\overrightarrow{2,3}andg:\{2,3\}\overrightarrow{5,6}$ are given by $f=\{(5,2),(6,3)\}$ and $g=\{(2,5),(3,6)\}$, find fog.

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60. If a function $g=\{(1,1),(2,3),(3,5),(4,7)\}$ is described by $g(x)=\alpha x+\beta$, find the values of $\alpha and \beta$.

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61. Show that $f:R-[0]\overrightarrow{R}0[0]$ given by $f(x)=\frac{3}{x}$ is invertible and it is inverse of itself.

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62. Let $A = \{1, 2, \ldots, n\}$ and $B = \{a, b\}$. Then number of surjections from A into B is nP2 (b) $2^n - 2$ (c) $2^n - 1$ (d) nC2

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63. If $f: R\overrightarrow{-1, 1}$ is defined by $f(x) = -\frac{x|x|}{1+x^2}, then f^{-1}(x)$ equals $\sqrt{\frac{|x|}{1-|x|}}$ (b) $-sgn(x)\sqrt{\frac{|x|}{1-|x|}}$ $-\sqrt{\frac{x}{1-x}}$ (d) none of these

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64. Let $f: Z\overrightarrow{Z}$ be defined by $f(n) = 3n$ for all $n \in Z$ and $g: Z\overrightarrow{}$ be defined by

$f(n) = \left\{\frac{n}{3}, \text{ if } nisa\mu ltipleof30, \text{ if } nis\neg\mu ltipleof3f \text{ or } al\ln \in Z.\right.$

Show that $gof = I_Z$ and $fog \neq I_Z$

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65. Let $A = \{x \in R : 0 \leq x \leq 1\}$. If $f : A\overrightarrow{A}$ is defined by $f(x) = \{x, \text{ if } xQ1 - x, \text{ if } xQ$ then prove that $fof(x) = x$ for all $x \in A$.

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66. Let $A = [-1, 1]$. Then, discuss whether the following functions from A to itself are one-one onto or bijective: $f(x) = \frac{x}{2}$ (ii) $g(x) = |x|$ (iii) $h(x) = x^2$

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67. Let R be a relation on the set A of ordered pairs of positive integers defined by $(x, y)\ R\ (u, v)$ if and only if $xv = yu$. Show that R is an equivalence relation.

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68. Let A be a finite set. If $f: A\vec{A}$ is an onto function, show that f is one-one also.

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69. Show that the function $f: R - \{3\} \rightarrow R - \{1\}$ given by $f(x) = \frac{x-2}{x-3}$ is bijection.

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70. Show that the function $f: R^{\rightarrow}$ given by $f(x) = x^3 + x$ is a bijection.

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71. Let $f: N \cup \{0\}\vec{N} \cup \{0\}$ be defined by $f\{n+1, \quad \text{if} \quad n$ is even n-1,if n is odd Show that f is a bijection.

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72. Let $f: N-[1]\vec{N}$ be defined by, $f(n) =$ the highest prime factor of$n$.

Show that f is neither one-one nor onto. Find the range of f.

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73. Let $A = \{1, 2\}$. Find all one-to-one function from A to A.

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74. Let $f: R^{\rightarrow}$ and g: RvecR$bedef \in ed + 1andg(x) = x - 1.$ Show that

$fog = gof = I_R.$

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75. Verify assoiativity for the following three mappings : $f: N\vec{Z}_0$ (the set of non zero integers), $g: Z_0\vec{Z}$ and $h: Q\vec{R}$ given by

$f(x) = 2x, g(x) = \frac{1}{x}$ and $h(x) = e^x$.

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76. If the set A contains 5 elements and the set B contains 6 elements, then the number of one-one and onto mappings from A to B is (a)720 (b) 120 (c) 0 (d) none of these

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77. If the set A contains 7 elements and the set B contains 10 elements, then the number of one-one functions from A to B is

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78. $f: R \to R$ is defined by $f(x) = \frac{e^x \hat{\ } 2 - e^{-x} \hat{\ } 2}{e^x \hat{\ } 2 + e^{-x} \hat{\ } 2}$ is (a) one-one but not onto (b) many-one but onto (c) one-one and onto (d) neither one-one nor onto

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79. The inverse of the function $f: \overrightarrow{Rx \in R : x < 1}$ given by $f(x) = \frac{e^x - e^{-x}}{e^x + e^{-x}}$, is $\frac{1}{2}\frac{\log(1+x)}{1-x}$ (b) $\frac{1}{2}\frac{\log(2+x)}{2-x}$ $\frac{1}{2}\frac{\log(1-x)}{1+x}$ (d) None of these

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80. Let $A = \{1, 2, 3\}$. Write all one-one from A to itself.

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81. If $f: \overrightarrow{RR}$ be the function defined by $f(x) = 4x^3 + 7$, show that f is a bijection.

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82. If the function $f:[1,\infty)\to[1,\infty)$ is defined by $f(x)=2^{x(x-1)}$, then $f^{-1}(x)$ is (A) $\left(\frac{1}{2}\right)^{x(x-1)}$ (B) $\frac{1}{2}\sqrt{1+4\log_2 x}$ (C) $\frac{1}{2}\left(1-\sqrt{1+4\log_2 x}\right)$ (D) not defined

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83. The value of parameter α, for which the function $f(x)=1+\alpha x, \alpha\neq 0$ is the inverse of itself

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84. Let R^+ be the set of all non-negative real numbers. if $f:R^+\to R^+$ and $g:R^+\to R^+$ are defined as $f(x)=x^2$ and $g(x)=+\sqrt{x}$. Find fog and gof. Are they equal functions.

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85. Show that the function $f : R \rightarrow R$ is given by $f(x) = 1 + x^2$ is not invertible.

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86. If $f : \overrightarrow{R - 1, 1}$ defined by $f(x) = \frac{10^x - 10^{-x}}{10^x + 10^{-x}}$ is invertible, find f^{-1}

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87. Let $f : [-1, \infty]\overrightarrow{-1,}$ is given by $f(x) = (x+1)^2 - 1, x \geq -1$. Show that f is invertible. Also, find the set $S = \{x : f(x) = f^{-1}(x)\}$.

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88. Let $f : \overrightarrow{NS}$ be a function defined as $f(x) = 4x^2 + 12x + 15$. Show that $f : \overrightarrow{NS}$, where S is the range of f, is invertible. Also find the inverse of f

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89. Let $A = R - \{3\}$ and $B = R - [1]$. Consider the function $f: \overrightarrow{AB}$ defined by $f(x) = \left(\frac{x-2}{x-3}\right)$. Show that f is one-one and onto and hence find f^{-1}

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90. Let $f, g: \overrightarrow{R}$ be defined by $f(x) = 2x + 1$ and $g(x) = x^2 - 2$ for all $x \in R$, respectively. Then, find gof

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

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92. If $f: A \to A, g: A \to A$ are two bijections, then prove that fog is an injection (ii) fog is a surjection.

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93. Let $f: Z \to Z$ be defined by $f(x) = x + 2$. Find $g: Z \to Z$ such that $gof = I_Z$.

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94. Which one the following relations on $A = \{1, 2, 3\}$ is function? $f = \{(1, 3), (2, 3), (3, 2), g = \{(1, 2), (1, 23), (3, 1)\}$

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95. Write the domain of the real function f defined by $f(x) = \sqrt{25 - x^2}$.

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96. Let $A\}x: -1 \leq x \leq 1\} and f: A^{\rightarrow}$ such that $f(x) = x|x|$, then f is a bijection (b) injective but not surjective Surjective but not injective (d) neither injective nor surjective

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97. If the function $f: (1, \infty) \rightarrow (1, \infty)$ is defined by $f(x) = 2^{x(x-1)}, then f^{-1}(x)$ is

$(a)\left(\frac{1}{2}\right)^{x(x-1)}$

(b) $\frac{1}{2}\left(1 + \sqrt{1 + 4(\log)_2 x}\right)$

$(c)\frac{1}{2}\left(1 - \sqrt{1 + (\log)_2 x}\right.$

(d) not defined

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

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99. Let f be a real function defined by $f(x)=\sqrt{x-1.}$ Find $(fofof)(x)$. Also, show that $fof \neq f^2$.

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100. Let $f: R \rightarrow R$ be the function defined by $f(x)=4x-3$ for all $x \in R$. Then write f^{-1}.

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101. Find whether $f: R \rightarrow R$ given by $f(x)=x^3+2$ for all $x \in R$.

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102. Find whether $f : Z \to Z$ given by $f(x) = x^2 + 1$ for all $x \in Z$

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103. Show that the function $f : Z \to Z$ defined by $f(x) = x^2$ for all $x \in Z$, is a function but not bijective function.

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104. Discuss the surjectivity of $f : R \to R$ given by $f(x) = x^3 + 2$ for all $x \in R$

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105. Discuss the surjectivity of $f : R \to R$ given by $f(x) = x^2 + 2$ for all $x \in R$

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106. Discuss the surjectivity of $f: Z \rightarrow Z$ given by $f(x) = 3x + 2$ for all $x \in Z$.

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107. Show that the function $f: N \rightarrow N$ given by $f(1) = f(2) = 1$ and $f(x) = x - 1$ for every $x \geq 2$, is onto but not one-one.

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108. Show that the Signum function $f: R \rightarrow R$, given by $f(x) = \left\{ \begin{pmatrix} 1 & x > 0 \\ 0 & x = 0 \\ -1 & x < 0 \end{pmatrix} \right\}$ is neither one-one nor onto

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109. Prove that the function $f: Q \to Q$ given by $f(x) = 2x - 3$ for all $x \in Q$ is a bijection.

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110. Show that the function $f: R \to R$ defined by $f(x) = 3x^3 + 5$ for all $x \in R$ is a bijection.

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111. Let $A = \{x \in R : -1 \leq x \leq 1\} = B$. Then, the mapping $f: A \to B$ given by $f(x) = x|x|$ is (a) injective but not surjective (b) surjective but not injective (c) bijective (d) none of these

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112. Let A be the set of all 50 students of class XII in a central school. Let $f: A \to N$ be a function defined by $f(x) =$ Roll number of student x

Show that f is one-one but not onto.

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113. Show that the function $f: N \to N$, given by $f(x) = 2x$, is one-one but not onto.

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114. Prove that $f: R \to R$, given by $f(x) = 2x$, is one-one and onto.

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

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116. Show that $f: R \rightarrow R$, defined as $f(x) = x^3$, is a bijection.

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117. Show that the function $f: R_0 \rightarrow R_0$, defined as $f(x) = \frac{1}{x}$, is one-one onto, where R_0 is the set of all non-zero real numbers. Is the result true, if the domain R_0 is replaced by N with co-domain being same as R_0 ?

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118. Prove that the greatest integer function $f: R \rightarrow R$, given by $f(x) = [x]$, is neither one-one nor onto, where [x] denotes the greatest integer less than or equal to x.

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119. Show that the modulus function $f: R \rightarrow R$, given by $f(x) = |x|$ is neither one-one nor onto.

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120. Let C be the set of complex numbers. Prove that the mapping $F: C \rightarrow R$ given by $f(z) = |z|, \forall z \in C,$ is neither one-one nor onto.

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121. Show that the function $f: R^{\rightarrow}$ given by $f(x) = xa + b,$ where $a, b \in R, a \neq 0$ is a bijection.

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122. Show that the function $f: R \rightarrow R$ given by $f(x) = \cos x$ for all $x \in R$, is neither one-one nor onto.

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123. Let $A = R - \{2\}$ and $B = R - \{1\}$. If $f: A \rightarrow B$ is a mapping defined by $f(x) = \frac{x-1}{x-2}$, show that f is bijective.

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124. Let A and B be two sets. Show that $f: A \times B \rightarrow B \times A$ defined by $f(a, b) = (b, a)$ is a bijection.

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125. Let A be any non-empty set. Then, prove that the identity function on set A is a bijection.

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126. Let $f: N - \{1\} \rightarrow N$ be defined by, $f(n) =$ the highest prime factor of n. Show that f is neither one-one nor onto. Find the range of f.

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127. Let $A = \{1, 2\}$. Find all one-to-one function from A to A.

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128. Consider the identity function $I_N: N \rightarrow N$ defined as, $I_N(x) = x$ for all $x \in N$. Show that although I_N is onto but $I_N + I_N: N \rightarrow N$ defined as $(I_N + I_N)(x) = I_N(x) + I_N(x) = x + x = 2x$ is not onto.

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129. Consider a function $f: \left[0, \frac{\pi}{2}\right] \rightarrow R$ given by $f(x) = \sin x$ and $g: \left[0, \frac{\pi}{2}\right] \rightarrow R$ given by $g(x) = \cos x$. Show that f and g are one-one, but $f + g$ is not one-one.

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130. Let $f: X \to Y$ be a function. Define a relation R in X given by $R = \{(a, b): f(a) = f(b)\}$. Examine whether R is an equivalence relation or not.

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131. Show that the function $f: R \to R$ given by $f(x) = x^3 + x$ is a bijection.

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132. Show that $f: n \to N$ defined by $f(n) = \left\{\left(\left(\frac{n+1}{2}, (\text{ if } nisodd)\right), \left(\frac{n}{2}, (\text{ if } niseven)\right)\right.$ is many - one onto function

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133. Show that the function $f: N \to N$ given by, $f(n) = n - (-1)^n$ for all $n \in N$ is a bijection.

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134. Let $f: N \cup \{0\} \to N \cup \{0\}$ be defined by $f(n) = \{n+1, \quad \text{if} \quad n \, is \, even \cap -1, \quad \text{if} \quad n \, is \, odd$ Show that f is a bijection.

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135. Let A be a finite set. If $f: A \to A$ is a one-one function, show that f is onto also.

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136. Let A be a finite set. If $f: A \rightarrow A$ is an onto function, show that f is one-one also.

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137. Give an example of a function which is one-one but not onto. which is not one-one but onto. (iii) which is neither one-one nor onto.

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138. Which of the following functions from A to B are one-one and onto?

$f_1 = \{(1, 3), (2, 5), (3, 7)\}; \ A = \{1, 2, 3\}, \ B = \{3, 5, 7\}$ (ii)

$f_2 = \{(2, a), (3, b), (4, c)\}; \ A = \{2, 3, 4\}, \ B = \{a, b, c\}$ (iii)

$f_3 = \{(a, x), (b, x), (c, z), (d, z)\}; \ A = \{a, b, c, d\}, \ B = \{x, y, z\}$

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139. Prove that the function $f: N \to N$, defined by $f(x) = x^2 + x + 1$ is one-one but not onto.

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140. Let $A = \{-1, 0, 1\}$ and $f = \{(x, x^2) : x \in A\}$. Show that $f: A \to A$ is neither one-one nor onto.

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141. Classify $f: N \to N$ given by $f(x) = x^2$ as injection, surjection or bijection.

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142. Classify $f: Z \to Z$ given by $f(x) = x^2$ as injection, surjection or bijection.

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143. Classify $f: N \rightarrow N$ given by $f(x) = x^3$ as injection, surjection or bijection.

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144. Classify $f: Z \rightarrow Z$ given by $f(x) = x^3$ as injection, surjection or bijection.

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145. Classify $f: R \rightarrow R$, defined by $f(x) = |x|$ as injection, surjection or bijection.

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146. Classify $f: Z \rightarrow Z$, defined by $f(x) = x^2 + x$ as injection, surjection or bijection.

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147. Classify $f: Z \rightarrow Z$, defined by $f(x) = x - 5$ as injection, surjection or bijection.

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148. Classify $f: R \rightarrow R$, defined by $f(x) = \sin x$ as injection, surjection or bijection.

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149. Classify $f: R \rightarrow R$, defined by $f(x) = x^3 + 1$ as injection, surjection or bijection.

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150. Classify $f: R \rightarrow R$, defined by $f(x) = x^3 - x$ as injection, surjection or bijection.

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151. Classify $f: R \rightarrow R$, defined by $f(x) = \sin^2 x + \cos^2 x$ as injection, surjection or bijection.

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152. Classify $f: Q - \{3\} \rightarrow Q$, defined by $f(x) = \frac{2x+3}{x-3}$ as injection, surjection or bijection.

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153. Classify $f: Q \rightarrow Q$, defined by $f(x) = x^3 + 1$ as injection, surjection or bijection.

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154. Classify $f: R \rightarrow R$, defined by $f(x) = 5x^3 + 4$ as injection, surjection or bijection.

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155. Classify $f: R \rightarrow R$, defined by $f(x) = 3 - 4x$ as injection, surjection or bijection.

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156. Classify $f: R \rightarrow R$, defined by $f(x) = 1 + x^2$ as injection, surjection or bijection.

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157. Classify $f: R \to R$, defined by $f(x) = \frac{x}{x^2+1}$ as injection, surjection or bijection.

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158. If $f: A \to B$ is an injection such that range of $f = \{a\}$. Determine the number of elements in A .

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159. Show that the function $f: R - \{3\} \to R - \{1\}$ given by $f(x) = \frac{x-2}{x-3}$ is a bijection.

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160. Let $A = [-1, 1]$. Then, discuss whether the following functions from A to itself are one-one, onto or bijective: $f(x) = \frac{x}{2}$ (ii) $g(x) = |x|$ (iii) $h(x) = x^2$

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161. Are the following set of ordered pairs functions? If so, examine whether the mapping is injective or surjective: $\{(x, y) : x$ is a person, y is the mother of $x\}$ (ii) $\{(a, b) : a$ is a person, b is an ancestor of $a\}$

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162. Let $A = \{1, 2, 3\}$. Write all one-one from A to itself.

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163. If $f: R \rightarrow R$ be the function defined by $f(x) = 4x^3 + 7$, show that f is a bijection.

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164. Show that the exponential function $f: R \rightarrow R$, given by $f(x) = e^x$, is one-one but not onto. What happens if the co-domain is replaced by R^+ (set of all positive real numbers).

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165. Show that the logarithmic function $f: R0 \pm > R$ given by $f(x) = (\log)_a x, \ a > 0$ is a bijection.

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166. Show that a one-one function $f: \{1, 2, 3\} \rightarrow \{1, 2, 3\}$must be onto.

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167. If $A = \{1, 2, 3\}$, show that an onto function $f: A \rightarrow A$ must be one-one

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168. Find the number of all onto functions from the set $A = \{1, 2, 3, , n\}$ to itself.

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169. Give examples of two one-one functions f_1 and f_2 from R to R such that $f_1 + f_2: R \rightarrow R$, defined by $(f_1 + f_2)(x) = f_1(x) + f_2(x)$ is not one-one.

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170. Give examples of two surjective function f_1 and f_2 from Z to Z such that $f_1 + f_2$ is not surjective.

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171. Show that if f_1 and f_2 are one-one maps from R to R , then the product $f_1 \times f_2 : R \to R$ defined by $(f_1 \times f_2)(x) = f_1(x) f_2(x)$ need not be one-one.

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172. Suppose f_1 and f_2 are non-zero one-one functions from R to R . Is $\frac{f_1}{f_2}$ necessarily one-one? Justify your answer. Here, $\frac{f_1}{f_2} : R \to R$ is given by $\left(\frac{f_1}{f_2}\right)(x) = \frac{f_1(x)}{f_2(x)}$ for all $x \in R$.

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173. Given $A = \{2, 3, 4\}$, $B = \{2, 5, 6, 7\}$. Construct an example of an injective map from A to B.

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174. Given $A = \{2, 3, 4\}$, $B = \{2, 5, 6, 7\}$. Construct an example of a mapping from A to B which is not injective

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175. Given $A = \{2, 3, 4\}$, $B = \{2, 5, 6, 7\}$. Construct an example of a mapping from A to B.

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176. Show that $f: R \rightarrow R$, given by $f(x) = x - [x]$, is neither one-one nor onto.

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177. Let $f: N \to N$ be defined by: $f(n) = \{n+1, \quad \text{if} \quad n\,is\,odd n-1, \quad \text{if} \quad n\,is\,even$ Show that f is a bijection.

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178. Let R be the set of real numbers. If $f: R \to R: f(x) = x^2$ and $g: R \to R; g(x) = 2x+1$. Then, find fog and gof . Also, show that $fog \neq gof$.

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179. Let : $R \to R$; $f(x) = \sin x$ and $g: R \to R$; $g(x) = x^2$ find fog and gof .

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180. Let $f:\{2, 3, 4, 5\}\overrightarrow{3, 4, 5, 9}andg:\{3, 4, 5, 9\}\overrightarrow{7, 11, 15}$ be functions defined at

$f(2)=3, f(3)=4, f(4)=f(5)=5, g(3)=g(4)=7, andg(5)=g(9)=$

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181. Let $f:\{1,\ 3, 4\} \rightarrow \{1,\ 2,\ 5\}$ and $g:\{1,\ 2,\ 5\} \rightarrow \{1,\ 3\}$ be given by $f=\{(1,\ 2),\ (3,\ 5),\ (4,\ 1)\}$ and $g=\{(1,\ 3),\ (2,\ 3),\ (5,\ 1)\}$. Write down gof.

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182. Find gof and fog , if $f:R \rightarrow R$ and $g:R \rightarrow R$ are given by $f(x)=|x|$ and $g(x)=|5x-2|$.

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183. If the functions f and g are given by $f = \{(1,\ 2),\ (3,\ 5),\ (4,\ 1)\}$ and $g = \{(2,\ 3),\ (5,\ 1),\ (1,\ 3)\}$, find range of f and g . Also, write down fog and gof as sets of ordered pairs.

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184. If the function $f: R \to R$ be given by $f(x) = x^2 + 2$ and $g: R \to R$ be given by $g(x) = \dfrac{x}{x-1}$. Find fog and gof .

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185. If $f: R - \left\{\dfrac{7}{5}\right\} \to R - \left\{\dfrac{3}{5}\right\}$ be defined as $f(x) = \dfrac{3x+4}{5x-7}$ and $g: R - \left\{\dfrac{3}{5}\right\} \to R - \left\{\dfrac{7}{5}\right\}$ be defined as $g(x) = \dfrac{7x+4}{5x-3}$. Show that $gof = I_A$ and $fog = I_B$, where $B = R - \left\{\dfrac{3}{5}\right\}$ and $A = R - \left\{\dfrac{7}{5}\right\}$.

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186. If $f: R \rightarrow R$is defined by $f(x) = x^2 - 3x + 2$, find $f(f(x))$.

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187. If $f, g: R\overrightarrow{R}$ are defined respectively by $f(x) = x^2 + 3x + 1, g(x) = 2x - 3,$ find fog (ii) gof (iii) fof (iv) gog.

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188. Let $f: Z \rightarrow Z$ be defined by $f(x) = x + 2.$ Find $g: Z \rightarrow Z$ such that $gof = I_Z$.

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189. If $f: Z \rightarrow Z$ be defined by $f(x) = 2x$ for all $x \in Z$. Find $g: Z \rightarrow Z$ such that $gof = I_Z$.

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190. Let f, g and h be functions from R to R. Show that $(f+g)oh = foh + goh$

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191. Let f, g and h be functions from R to R. Show that $(fg)oh = (foh)(goh)$

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192. Let $f: R \to R$ be the signum function defined as $f(x) = \{1, x > 0, \quad 0, x = 0, \quad -1, x < 0$ and $g: R \to R$ be the greatest integer function given by $g(x) = [x]$. Then, prove that fog and gof coincide in $(0, 1]$.

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193. Let $A = \{x \in R : 0 \leq x \leq 1\}$. If $f : A\overrightarrow{A}$ is defined by $f(x) = \{x, \text{ if } x Q 1 - x, \text{ if } x Q$ then prove that $fof(x) = x$ for all $x \in A$.

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194. Let $f : R\overrightarrow{R}$ and $g : \overrightarrow{R}$ be two functions such that $fog(x) = \sin x^2 andgof(x) = \sin^2 x$. Then, find $f(x)andg(x)$.

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195. If $f : R \to R$ be given by $f(x) = \sin^2 x + \sin^2(x + \pi/3) + \cos x \cos(x + \pi/3)$ for all $x \in R$, and $g : R \to R$ be such that $g(5/4) = 1$, then prove that $gof : R \to R$ is a constant function.

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196. Let $f: Z\overrightarrow{Z}$ be defined by $f(n) = 3n$ for all $n \in Z$ and $g: Z^{\rightarrow}$ be defined by

$f(n) = \left\{\frac{n}{3}, \quad \text{if} \quad n is a \mu l tip le of 30, \quad \text{if} \quad n is \neg \mu l tip le of 3 f \text{ or } a l \ln \in Z.\right.$

Show that $gof = I_Z$ and $fog \neq I_Z$

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197. Let $f: R\overrightarrow{R}$ be a function given by $f(x) = ax + b$ for all $x \in R$. Find the constants $a and b$ such that $fof = I_R.$

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198. Let $f: A \rightarrow A$ be a function such that $fof = f$. Show that f is onto if and only if f is one-one. Describe f in this case.

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199. Let $f, g: R\overrightarrow{R}$ be two functions defined as $f(x) = |x| + x$ and $g(x) = |x| - x$, for all xR. Then find fog and gof.

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200. Find gof and gof when $f: R \rightarrow R$ and $g: R \rightarrow R$ is defined by $f(x) = 2x + 3$ and $g(x) = x^2 + 5$

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201. Find gof and gof when $f: R \rightarrow R$ and $g: R \rightarrow R$ is defined by $f(x) = 2x + x^2$ and $g(x) = x^3$

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202. Find $fog(2)$ and $gof(1)$ when: $f: R \rightarrow R; f(x) = x^2 + 8$ and $g: R \rightarrow R; g(x) = 3x^3 + 1.$

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203. Find gof and fog when $f: R \rightarrow R$ and $g: R \rightarrow R$ is defined by $f(x) = x$ and $g(x) = |x|$

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204. Find gof and fog when $f: R \rightarrow R$ and $g: R \rightarrow R$ is defined by $f(x) = x^2 + 2x - 3$ and $g(x) = 3x - 4$

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205. Find gof and gof when $f: R \rightarrow R$ and $g: R \rightarrow R$ is defined by $f(x) = 8x^3$ and $g(x) = x^{1/3}$

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206. Let $f = \{(3,\ 1),\ (9,\ 3),\ (12,\ 4)\}$ and $= \{(1,\ 3),\ (3,\ 3),\ (4,\ 9),\ (5,\ 9)\}$. Show that gof and fog are both defined. Also, find fog and gof.

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207. Let $f = \{(1,\ -1), (4,\ -2), (9,\ -3), (16, 4)\}$ and $g = \{(-1,\ -2), (02,\ -4), (-3,\ -6), (4, 8)\}$. Show that gof is defined while fog is not defined. Also, find gof.

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208. Let $A = \{a,\ b,\ c\}$, $B = \{u\ v,\ w\}$ and let f and g be two functions from A to B and from B to A respectively defined as: $f = \{(a,\ v),\ (b,\ u),\ (c,\ w)\}$, $g = \{(u,\ b),\ (v,\ a),\ (w,\ c)\}$. Show that f and g both are bijections and find fog and gof.

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209. Find $fog\,(2)$ and $gof\,(1)$ when: $f: R \to R$; $f(x) = x^2 + 8$ and $g: R \to R\,; g(x) = 3x^3 + 1$.

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210. Let R^+ be the set of all non-negative real numbers. If $f: R^+ \to R^+$ and $g: R^+ \to R^+$ are defined as $f(x) = x^2$ and $g(x) = +\sqrt{x}$. Find fog and gof. Are they equal functions.

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211. Let $f: R \to R$ and $g: R \to R$ be defined by $f(x) = x^2$ and $g(x) = x + 1$. Show that $fog \neq gof$.

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212. Let $f: \overrightarrow{RR}$ and $g: \overrightarrow{RR}$ be defined by $f(x) = x + 1$ and $g(x) = x - 1$. Show that $fog = gof = I_R$.

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213. Verify assoiativity for the following three mappings : $f: N\vec{Z}_0$ (the set of non zero integers), $g: Z_0\vec{Z}$ and $h: Q\vec{R}$ given by $f(x) = 2x,\ g(x) = \frac{1}{x}$ and $h(x) = e^x$.

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214. Consider $f: N \rightarrow N, g: N \rightarrow N$and $h: N \rightarrow R$defined as $f(x) = 2x$, $g(y) = 3y + 4$and $h(z) = s \in z$, $\forall$x, y and z in N. Show that ho(gof) = (hog) of.

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215. Given examples of two functions $f:\quad N \rightarrow N \quad andg:\quad N \rightarrow N$ such that of is onto but f is not onto. (Hint: Consider $f(x) \quad = \quad x \quad andg(x) \quad = \quad |x|$).

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216. Give examples of two functions $f: \quad N \rightarrow Z \quad and g: \quad Z \rightarrow Z$ such that o f is injective but is not injective. (Hint: Consider $f(x) \quad = \quad x \quad and g(x) \quad = \quad |x|$)

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217. If $f: A\vec{B}\, and g: B\vec{C}$ are one-one functions, show that gof is one-one function.

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218. If $f: R \rightarrow R$ and $g: R \rightarrow R$ be functions defined by $f(x) = x^2 + 1$ and $g(x) = \sin x,$ then find fog and gof .

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219. If $f: [0, \infty)\overrightarrow{R} and g: R\overrightarrow{R}$ be defined as $f(x) = \sqrt{x}$ and $g(x) = -x^2 - 1$, then find $gof and fog$.

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220. If $f(x) = e^x$ and $g(x) = (\log)_e x (x > 0)$, find $fog and gof$. Is $fog = gof$?

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221. If $f(x) = \sqrt{x} (x > 0)$ and $g(x) = x^2 - 1$ are two real functions, find fog and gof is $fog = gof$?

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222. If $f(x) = \frac{1}{x}$ and $g(x) = 0$ are two real functions, show that fog is not defined.

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223. Let $f(x) = [x]$ and $g(x) = |x|$. Find $(gof)\left(\frac{5}{3}\right) fog\left(\frac{5}{3}\right)$

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224. Let $f(x) = [x]$ and $g(x) = |x|$. Find $(gof)\left(\frac{5}{3}\right) - fog\left(\frac{5}{3}\right)$

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225. Let $f(x) = [x]$ and $g(x) = |x|$. Find $(f + 2g)(-1)$

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226. Let $fandg$ be real functions defined by $f(x) = \frac{x}{x+1} andg(x) = \frac{1}{x+3}$. Describe the functions $gofandfog$ (if they exist).

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227. If $f(x)=\frac{3x-2}{2x-3}$, prove that $f(f(x))) = x$ for all $x \in R - \left\{\frac{3}{2}\right\}$.

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228. 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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229. If $f(x)=\frac{x}{\sqrt{1+x^2}}$ then $fofof(x)$

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230. Let f be a real function defined by $f(x)=\sqrt{x-1}$. Find $(fofof)(x)$. Also, show that $fof \neq f^2$.

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231. If $f(x)=\frac{x-1}{x+1}, x\ne -1,$ then show that $f(f(x))=-\frac{1}{x}$ provided that $x\ne 0, 1.$

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232. Find fog and gof , if $f(x)=e^{x}$, $g(x)=(\log)_e x$

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233. Find fog and gof , if $f(x)=x^{2}$, $g(x)=\cos x$

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234. Find fog and gof , if $f(x)=|x|$, $g(x)=\sin x$

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235. Find fog and gof, if $f(x) = x + 1$, $g(x) = e^x$

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236. Find fog and gof, if $f(x) = \sin^{-1} x$, $g(x) = x^2$

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237. Find fog and gof, if $f(x) = x + 1$, $g(x) = \sin x$

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238. Find fog and gof, if $f(x) = x + 1$, $g(x) = 2x + 3$

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239. Find fog and gof , if $f(x) = c, \ c \in R$, $g(x) = \sin x^2$

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240. Find fog and gof , if $f(x) = x^2 + 2$, $g(x) = 1 - \frac{1}{1 - x}$

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241. Let $f(x) = x^2 + x + 1$ and $g(x) = \sin x$. Show that $fog \neq gof$.

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242. $Let f: R \rightarrow R: f(x) = |x|$, Prove that $fof = f$

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243. If $f(x) = 2x + 5$ and $g(x) = x^2 + 1$ be two real functions, then describe f^2. Also, show that $fof \neq f^2$.

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244. If $f(x) = 2x + 5$ and $g(x) = x^2 + 1$ be two real functions, then describe f^2. Also, show that $fof \neq f^2$.

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245. If $f(x) = 2x + 5$ and $g(x) = x^2 + 1$ be two real functions, then describe f^2. Also, show that $fof \neq f^2$.

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246. If $f(x) = 2x + 5$ and $g(x) = x^2 + 1$ be two real functions, then describe f^2. Also, show that $fof \neq f^2$.

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247. If $f(x) = \sin x$ and $g(x) = 2x$ be two real functions, then describe gof and fog. Are these equal functions?

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248. Let $f, \ g, \ h$ be real functions given by $f(x) = \sin x$, $g(x) = 2x$ and $h(x) = \cos x$. Prove that $fog = go(fh)$.

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249. Let f be any real function and let g be a function given by $g(x) = 2x$. Prove that $gof = f + f$.

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250. If $f(x) = \sqrt{1-x}$ and $g(x) = (\log)_e x$ are two real functions, then describe functions fog and gof .

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251. If $f: (-\pi/2, \pi/2) \rightarrow R$ and $g: [-1, 1] \rightarrow R$ be defined as $f(x) = \tan x$ and $g(x) = \sqrt{1-x^2}$ respectively. Describe fog and gof .

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252. If $f(x) = \sqrt{x+3}$ and $g(x) = x^2 + 1$ be two real functions, then find fog and gof .

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253. Let f be a real function given by $f(x) = \sqrt{x-2}$. Find fof. Also, show that $fof \neq f^2$

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254. If $f, : R\overrightarrow{R}$ be two functions defined as $f(x) = |x| + x$ and $g(x) = |x| - x, \forall x R,$ Then find fog and gof. Hence find $fog(-3), fog(5)$ and $gof(-2)$.

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255. If $f: Q \rightarrow Q$ is given by $f(x) = x^2$, then find $f^{-1}(9)$

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256. If $f: Q \rightarrow Q$ is given by $f(x) = x^2$, then find $f^{-1}(-25)$

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257. If $f: Q \rightarrow Q$ is given by $f(x) = x^2$, then find $f^{-1}(9)$

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258. If the function $f: R \rightarrow R$ be defined by $f(x) = x^2 + 5x + 9$, find $f^{-1}(8)$ and $f^{-1}(9)$.

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259. If the function $f: C \rightarrow C$ be defined by $f(x) = x^2 - 1$, find $f^{-1}(9)$ and $f^{-1}(8)$.

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260. Let $f: R \rightarrow R$ be defined as $f(x) = x^2 + 1$. Find: $f^{-1}(10)$

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261. If $A = \{0, 1, 2, 3, \}$, $B = \{1, 3, 5, 7, 9\}$ and $f: A \rightarrow B$ is given by $f(x) = 2x + 1$, then write f and f^{-1} as a set of ordered pairs.

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262. Let $S = \{1, 2, 3\}$. Determine whether the functions $f: S \to S$defined as below have inverses. Find f^{-1}, if it exists.(a) $f = \{(1, 1), (2, 2), (3, 3)\}$ (b) $f = \{(1, 2), (2, 1), (3, 1)\}$

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263. Consider $f: \{1, 2, 3\} \to \{a, b, c\}$given by $f(1) = a,\ f(2) = b$and $f(3) = c$. Find $f^{-1}$and show that $\left(f^{-1}\right)^{-1} = f$.

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264. If $f: \vec{R}$ is defined by $f(x) = 2x + 7$. Prove that f is a bijection. Also, find the inverse of f.

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265. If $f: R \to R$ is a bijection given by $f(x) = x^3 + 3$, find $f^{-1}(x)$.

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266. Let $f: R \to R$ be defined by $f(x) = 3x - 7$. Show that f is invertible and hence find f^{-1}.

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267. Show that $f: R - cR0[0]$ given by $f(x) =$ is invertible and it is inverse of itself.

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268. Let $f: N \cup \{0\} \to N \cup \{0\}$ be defined by $f(n) = \{n + 1, \quad \text{if} \quad n\,is\,even, \quad n - 1, \quad \text{if} \quad n\,is\,odd$ Show that f is invertible and $f = f^{-1}$.

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269. Prove that the function $f: R \to R$ defined as $f(x) = 2x + 3$ is invertible. Also, find f^{-1}.

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270. Show that the function $f: R \to R$ is given by $f(x) = 1 + x^2$ is not invertible.

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271. Show that $f: R - \{-1\} \to R - \{1\}$ given by $f(x) = \dfrac{x}{x+1}$ is invertible. Also, find f^{-1}.

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272. Show that $f:[-1, 1] \rightarrow R$, given by $f(x) = \dfrac{x}{(x+2)}$ is one- one .

Find the inverse of the function $f:[-1, 1]$

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273. Let $f: R^{\rightarrow}$ be defined as $f(x) = 10x + 7$. Find the function $g: R\overrightarrow{R}$

such that $gof = fog = I_R.$

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274. If the function $f:[1, \infty) \rightarrow [1, \infty)$ is defined by $f(x) = 2^{x(x-1)}$,

then $f^{-1}(x)$ is (A) $\left(\frac{1}{2}\right)^{x(x-1)}$ (B) $\frac{1}{2}\sqrt{1+4\log_2 x}$ (C) $\frac{1}{2}\left(1-\sqrt{1+4\log_2 x}\right)$ (D) not defined

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275. The value of parameter α, for which the function $f(x) = 1 + \alpha x, \alpha \neq 0$ is the inverse of itself

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276. Let $f: N\overrightarrow{Y}$ be a function defined as $f(x) = 4x + 3$, where $Y = \{y \in N: y = 4x + 3 \text{ for some } x \in N\}$. Show that f is invertible and its inverse is (1) $g(y) = \frac{3y+4}{3}$ (2) $g(y) = 4 + \frac{y+3}{4}$ (3) $g(y) = \frac{y+3}{4}$ (4) $g(y) = \frac{y-3}{4}$

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277. Let $Y = \{n^2 : n \in N\} \in N$. Consider $f: N \rightarrow Y$ as $f(n) = n^2$. Show that f is invertible. Find the inverse of f.

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278. Let $f: N \rightarrow R$be a function defined as $f(x)=4x^2+12x+15.$ Show that $f: N \rightarrow S$, where, S is the range of f, is invertible. Find the inverse of f.

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279. State with reason whether following functions have inverse (i) $f:\{1,2,3,4thf=\{(1,10),(2,10),(3,10),(4,10)\}$(ii) $g:\{5,6,7,8\}withg=\{(5,4),(6,3),(7,4),(8,2)\}$(iii) `h :{2,3,4,5} ->{7,9

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280. State with reason whether following functions have inverse (i) $f:\{1,2,3,4\} \rightarrow \{10\}withf=\{(1,10),(2,10),(3,10),(4,10)\}$(ii) $g:\{5,6,7,8\} \rightarrow \{1,2,3,4\}withg=\{(5,4),(6,3),(7,4),(8,2)\}$(iii) `h : {2,3,4,5} ->{7,9

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281. Find f^{-1} if it exists: $f: A \to B$ where $A = \{0, -1, -3, 2\}$; $B = \{-9, -3, 0, 6\}$ and $f(x) = 3x$.

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282. Find f^{-1} if it exists: $f: A \to B$ where $A = \{1, 3, 5, 7, 9\}$; $B = \{0, 1, 9, 25, 49, 81\}$ and $f(x) = x^2$.

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283. Show that the function $f: Q \to Q$ defined by $f(x) = 3x + 5$ is invertible. Also, find f^{-1}.

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284. Consider $f: R \to R$given by $f(x) = 4x + 3$. Show that f is invertible. Find the inverse of f.

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285. Consider $f: R_+ \overrightarrow{4, \infty}$ given by $f(x) = x^2 + 4$. Show that f is invertible with the inverse f^{-1} of f given by $f^{-1}(y) = \sqrt{y-4}$, where R_+ is the set of all non-negative real numbers.

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286. If $f(x) = \frac{4x+3}{6x-4}, x \neq \frac{2}{3}$, show that $fof(x) = x$ for all $x \neq \frac{2}{3}$. What is the inverse of f?

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287. Consider $f: R_{\pm} > [-5, \infty)$given by $f(x) = 9x^2 + 6x - 5$. Show that f is invertible with $f^{-1}(y) = \left(\frac{\left(\sqrt{y+6}\right) - 1}{3}\right)$

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288. If $f: R \to R$ be defined by $f(x) = x^3 - 3$, then prove that f^{-1} exists and find a formula for f^{-1} . Hence, find $f^{-1}(24)$ and $f^{-1}(5)$.

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289. A function $f: R \to R$ is defined as $f(x) = x^3 + 4$. Is it a bijection or not? In case it is a bijection, find $f^{-1}(3)$.

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290. If $f: Q \to Q, \ \ g: Q \to Q$ are two functions defined by $f(x) = 2x$ and $g(x) = x + 2$, show that f and g are bijective maps. Verify that $(gof)^{-1} = f^{-1} og^{-1}$.

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291. Let $A = R - \{3\} and B = R - \{1\}$. Consider the function $f: A \rightarrow$ defined by $f(x) = \dfrac{x-2}{x-3}$. Show that is one-one and onto and hence find f^{-1}

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292. Consider $f: R_{\pm} > [-9, \infty[$ given by $f(x) = 5x^2 + 6x - 9$. Prove that f is invertible with $f^{-1}(y) = \dfrac{\sqrt{54 + 5y} - 3}{5}$

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293. Let $f: N \rightarrow$ be a function defined as $f(x) = 9x^2 + 6x - 5$. Show that $f: N\vec{S}$, where S is the range of f, is invertible. Find the inverse of f and hence $f^{-1}(43)$ and $f^{-1}(163)$.

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294. If $f: \overrightarrow{R-1, 1}$ defined by $f(x) = \frac{10^x - 10^{-x}}{10^x + 10^{-x}}$ is invertible, find f^{-1}

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295. If $f: R \rightarrow (0, 2)$ defined by $f(x) = \frac{e^x - e^{-x}}{e^x + e^{-x}} + 1$ is invertible, find f^{-1}.

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296. Let $f: [-1, \infty]\overrightarrow{-1,}$ is given by $f(x) = (x+1)^2 - 1, x \geq -1$. Show that f is invertible. Also, find the set $S = \{x : f(x) = f^{-1}(x)\}$.

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297. Let $A = \{x \in R \mid -1 \leq x \leq 1\}$ and let $f: A \rightarrow A,\ g: A \rightarrow A$ be two functions defined by $f(x) = x^2$ and $g(x) = \frac{\sin(\pi x)}{2}$. Show that g^{-1} exists but f^{-1} does not exist. Also, find g^{-1}.

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298. Let f be a function from R to R such that $f(x) = \cos(x+2)$. Is f invertible? Justify your answer.

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299. If $A = \{1, 2, 3, 4\}$ and $B = \{a, b, c, d\}$. Define any four bijectives from A to B . Also, give their inverse functions.

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300. Let A and B be two sets each with a finite number of elements. Assume that there is an injective mapping from A to Band that there is an injective mapping from B to A Prove that there is a bijective mapping from A to B.

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301. If $f: A\vec{A}$, $g: A^{\rightarrow}$ are two bijections, then prove that fog is an injection (ii) fog is a surjection.

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302. If $f: A \rightarrow A, \ \ g: A \rightarrow A$ are two bijections, then prove that fog is an injection.

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303. Let $A = \{1, \ 2, \ 3, \ 4\}$ and $B = \{a, \ b\}$ be two sets. Write total number of onto functions from A to B.

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304. Write total number of one-one functions from set $A = \{1, \ 2, \ 3, \ 4\}$ to set $B = \{a, \ b, \ c\}$.

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305. If $f: R \to R$ is defined by $f(x) = x^2$, write $f^{-1}(25)$.

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306. If $f: C \to C$ is defined by $f(x) = x^2$, write $f^{-1}(-4)$. Here, C denotes the set of all complex numbers.

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307. If $f: R \to R$ is given by $f(x) = x^3$, write $f^{-1}(1)$.

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308. Let C denote the set of all complex numbers. A function $f: C \to C$ is defined by $f(x) = x^3$. Write $f^{-1}(1)$.

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309. Let f be a function from C (set of all complex numbers) to itself given by $f(x) = x^3$. Write $f^{-1}(1)$.

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310. Let $f: R \rightarrow R$ be defined by $f(x) = x^4$, write $f^{-1}(1)$.

Watch Video Solution

311. If $f: C \rightarrow C$ is defined by $f(x) = x^4$, write $f^{-1}(1)$.

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312. If $f: R \rightarrow R$ is defined by $f(x) = x^2$, write $f^{-1}(25)$.

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313. If $f: C \rightarrow C$ is defined by $f(x) = (x-2)^3$, write $f^{-1}(-1)$.

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314. If $f: R \rightarrow R$ is defined by $f(x) = 10x - 7$, then write $f^{-1}(x)$.

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315. Let $f: \left\{-\frac{\pi}{2}, \frac{\pi}{2}\right\} \rightarrow R$ be a function defined by $f(x) = \cos[x]$. Write range (f).

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316. If $f: R \rightarrow R$ defined by $f(x) = 3x - 4$ is invertible then write $f^{-1}(x)$.

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317. If $f: R \rightarrow R$, $g: R \rightarrow R$ are given by $f(x) = (x+1)^2$ and $g(x) = x^2 + 1$, then write the value of $fog(-3)$.

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318. Let $A = \{x \in R: -4 \leq x \leq 4 \text{ and } x \neq 0\}$ and $f: A \rightarrow R$ be defined by $f(x) = \frac{|x|}{x}$. Write the range of f.

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319. Let $f: \left[-\frac{\pi}{2}, \frac{\pi}{2}\right] \rightarrow A$ be defined by $f(x) = \sin x$. If f is a bijection, write set A.

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320. Let $f: R \rightarrow R^+$ be defined by $f(x) = a^x$, $a > 0$ and $a \neq 1$. Write $f^{-1}(x)$.

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321. Let $f: R-\{-1\} \rightarrow R-\{1\}$ be given by $f(x)=\frac{x}{x+1}$. Write $f^{-1}(x)$.

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322. Let $f: R-\left\{-\frac{3}{5}\right\} \rightarrow R$ be a function defined as $f(x)=\frac{2x}{5x+3}$. Write f^{-1} : Range of $f \rightarrow R-\left\{-\frac{3}{5}\right\}$.

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323. Let $f: R \rightarrow R$, $g: R \rightarrow R$ be two functions defined by $f(x)=x^2+x+1$ and $g(x)=1-x^2$. Write $fog(-2)$.

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324. Let $f: R \rightarrow R$ be defined as $f(x) = \frac{2x - 3}{4}$. Write $fof^{-1}(1)$.

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325. Let f be an invertible real function. Write $(f^{-1}of)(1) + (f^{-1}of)(2) + \; + (f^{-1}of)(100)$.

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326. Let $A = \{1, 2, 3, 4\}$ and $B = \{a, b\}$ be two sets. Write total number of onto functions from A to B.

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327. Write the domain of the real function $f(x) = \sqrt{x - [x]}$.

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

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329. Write the domain of the real function $f(x) = \dfrac{1}{\sqrt{|x| - x}}$

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330. Write whether $f: R \rightarrow R$ given by $f(x) = x + \sqrt{x^2}$ is one-one, many-one, onto or into.

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331. If $\mathrm{f(x)} = x + 7$ and $g(x) = x - 7,\ x\ \ R,$ find $(fog)(7)$

A. 7

B. 0

C. 14

D. none of these

Answer: A

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332. What is the range of the function $f(x)=\frac{|x-1|}{x-1}$

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333. 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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334. If $f: R \rightarrow R$ is defined by $f(x)=3x+2$, find $f(f(x))$.

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335. Let $A = \{1, 2, 3\}, \ B = \{4, 5, 6, 7\}$ and let $f = \{(1, 4), \ (2, 5), \ (3, 6)\}$ be a function from A to B. State whether f is one-one or not.

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336. If $f: \{5, \ 6\} \to \{2, \ 3\}$ and $g: \{2, \ 3\} \to \{5, \ 6\}$ are given by $f = \{(5, \ 2), \ (6, \ 3)\}$ and $g = \{(2, \ 5), \ (3, \ 6)\}$, find fog.

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337. Let $f: R \to R$ be the function defined by $f(x) = 4x - 3$ for all $x \in R$. Then write f^{-1}.

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338. Which one the following relations on $A = \{1, 2, 3\}$ is a function?

$f = \{(1, 3), (2, 3), (3, 2)\}, g = \{(1, 2), (1, 3), (3, 1)\}$

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339. Write the domain of the real function f defined by $f(x) = \sqrt{25 - x^2}$.

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340. Let $A = \{a, b, c, d\} and f : A \vec{A}$ be given by $f = \{(a, b), (b, d), (c, a), (d, c)\}$, write f^{-1}.

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341. Let $f, g : R^{\rightarrow}$ be defined by $f(x) = 2x + 1 and g(x) = x^2 - 2$ for all $x \in R$, respectively. Then, find gof.

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342. If the mapping $f:\{1,\ 3,\ 4\}\to\{1,\ 2,\ 5\}$ and $g:\{1,\ 2,\ 5\}\to\{1,\ 3\}$, given by $f=\{(1,\ 2),\ (3,\ 5),\ (4,\ 1)\}$ and $g=\{(2,\ 3),\ (5,\ 1),\ (1,\ 3)\}$, write $fog\cdot$

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343. If a function $g=\{(1,1),(2,3),(3,5),(4,7)\}$ is described by $g(x)=\alpha x+\beta,$ find the values of $\alpha and \beta\cdot$

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344. If $f(x)=\ -4-(x-7)^3$, write $f^{-1}(x)\cdot$

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345. $f: R \to R$ given by $f(x) = x + \sqrt{x^2}$ is (a) injective (b) surjective (c) bijective (d) none of these

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346. If $f: A \to B$ given by $3^{f(x)} + 2^{-x} = 4$ is a bijection, then `A={x in R :-1

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347. The function $f: R \to R$ defined by $f(x) = 2^x + 2^{|x|}$ is (a) one-one and onto (b) many-one and onto (c) one-one and into (d) many-one and into

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348. Let the function $f: R - \{-b\} \to R - \{1\}$ be defined by $f(x) = \dfrac{x+a}{x+b}$, $a \neq b$, then (a) f is one-one but not onto (b) f is onto but not one-one (c) f is both one-one and onto (d) none of these

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349. The function $f: A \to B$ defined by $f(x) = -x^2 + 6x - 8$ is a bijection, if $A = (-\infty, 3]$ and $B = (-\infty, 1]$ (b) $A = [-3, \infty)$ and $B = (-\infty, 1]$ (c) $A = (-\infty, 3]$ and $B = [1, \infty)$ (d) $A = [3, \infty)$ and $B = [1, \infty)$

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350. Let $A = \{x \in R: -1 \leq x \leq 1\} = B$. Then, the mapping $f: A \to B$ given by $f(x) = x|x|$ is (a) injective but not surjective (b) surjective but not injective (c) bijective (d) none of these

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351. Let $f: R \to R$ be given by $f(x) = [x]^2 + [x+1] - 3$, where $[x]$ denotes the greatest integer less than or equal to x. Then, $f(x)$ is (a) many-one and onto (b) many-one and into (c) one-one and into (d) one-one and onto

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352. Let M be the set of all 2×2 matrices with entries from the set R of real numbers. Then the function $f: M \to R$ defined by $f(A) = |A|$ for every $A \in M$, is (a) one-one and onto (b) neither one-one nor onto (c) one-one but not onto (d) onto but not one-one

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353. The function $f: [0, \infty) \to R$ given by $f(x) = \dfrac{x}{x+1}$ is (a) one-one and onto (b) one-one but not onto (c) onto but not one-one (d) neither one-one nor onto

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354. The range of the function $f(x) = {}^{7-x}P_{x-3}$ is (a) {1, 2, 3, 4, 5} (b) {1, 2, 3, 4, 5, 6} (c) {1, 2, 3, 4} (d) {1, 2, 3}

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355. A function f from the set of natural numbers to integers is defined by n when n is odd f(n) 3, when n is even Then f is (b) one-one but not onto a) neither one-one nor onto (c) onto but not one-one (d) one-one and onto both

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356. Let f be an injective map. with domain (x, y, z and range (1, 2, 3), such that exactly one following statements is correct and the remaining are false : $f(x) = 1, f(y) \neq 1, f(z) \neq 2$ The value of $f^{-1})(1)$ is

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357. Which of the following function from Z to itself are bijections? $f(x) = x^3$ (b) $f(x) = x + 2$ $f(x) = 2x + 1$ (d) $f(x) = x^2 + x$

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358. Let $A = [-1, 1]$. Then, discuss whether the following functions from A to itself are one-one onto or bijective: $f(x) = \frac{x}{2}$ (ii) $g(x) = |x|$ (iii) $h(x) = x^2$

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359. Let $A\}x : -1 \leq x \leq 1\} and f : A^{\rightarrow}$ such that $f(x) = x|x|$, then f is a bijection (b) injective but not surjective Surjective but not injective (d) neither injective nor surjective

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360. If the function $f: R\overrightarrow{A}$ given by $f(x) = \frac{x^2}{x^2 + 1}$ is surjection, then find $A\cdot$

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361. If a function $f: [2, \infty) \rightarrow R$ defined by $f(x) = (x - 1)(x - 2)(x - 3)$ is (a) one-one but not onto (b) onto but not one-one (c) both one and onto (d) neither one-one nor onto

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362. The function $f: [-1/2, 1/2] \rightarrow [-\pi/2, \pi/2]$ defined by $f(x) = \sin^{-1}(3x - 4x^3)$ is (a) bijection (b) injection but not a surjection (c) surjection but not an injection (d) neither an injection nor a surjection

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363. Let $f: R \rightarrow R$ be a function defined by $f(x) = \frac{e^{|x|} - e^{-x}}{e^x + e^{-x}}$ then --

(1) f is bijection (2) f is an injection only (3) f is a surjection (4) f is neither injection nor a surjection

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364. Let $f: R - \{n\} \rightarrow R$ be a function defined by $f(x) = \frac{x - m}{x - n}$ such that $m \neq n$ 1) f is one one into function2) f is one one onto function3) f is many one into funciton4) f is many one onto funcionn then

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365. Let $f: R \rightarrow R$ be a function defined by $f(x) = \frac{x^2 - 8}{x^2 + 2}$. Then, f is

(a) one-one but not onto (b) one-one and onto (c) onto but not one-one

(d) neither one-one nor onto

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366. $f: R \rightarrow R$ is defined by $f(x) = \dfrac{e^x \,\hat{}\, 2 - e^{-x} \,\hat{}\, 2}{e^x \,\hat{}\, 2 + e^{-x} \,\hat{}\, 2}$ is (a) one-one but not onto (b) many-one but onto (c) one-one and onto (d) neither one-one nor onto

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367. The function $f: R \rightarrow R$, $f(x) = x^2$ is (a) injective but not surjective (b) surjective but not injective (c) injective as well as surjective (d) neither injective nor surjective

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368. A function f from the set of natural numbers to integers defined by $f(n) = \left\{ \dfrac{n-1}{2}, \, when\, n\, is\, odd - \dfrac{n}{2}, \, when\, n\, is\, even \right.$ is (a) neither one-one nor onto (b) one-one but not onto (c) onto but not one-one (d) one-one and onto both

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369. Which of the following functions from $A = \{x \in R : -1 \le x \le 1\}$ to itself are bijections? $f(x) = |x|$ (b) $f(x) = \frac{\sin(\pi x)}{2}$ (c) $f(x) = \frac{\sin(\pi x)}{4}$ (d) none of these

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370. Let $f: Z \to Z$ be given by $f(x) = \begin{cases} \frac{x}{2}, & \text{if } x \text{ is even}, \\ 0, & \text{if } x \text{ is odd} \end{cases}$. Then, f is (a) onto but not one-one (b) one-one but not onto (c) one-one and onto (d) neither one-one nor onto

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371. The function $f: R \to R$ defined by $f(x) = 6^x + 6^{|x|}$ is (a) one-one and onto (b) many one and onto (c) one-one and into (d) many one and into

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372. Let $f(x) = x^2$ and $g(x) = 2^x$. Then the solution set of the equation $fog(x) = gof(x)$ is R (b) {0} (c) {0, 2} (d) none of these

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373. If $f(x) = 3x - 5,$ then $f^{-1}(x)$ is given by $\frac{1}{(3x - 5)}$ is given by $\frac{(x + 5)}{3}$ does not exist because f is not one-one does not exist because f is not onto

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374. If $g(f(x)) = |\sin x| and f(g(x)) = \left(\sin\sqrt{x}\right)^2$, then $f(x) = \sin^2 x, g(x) = \sqrt{x}$ $f(x) = \sin x, g(x) = |x|$ $f(x = x^2, g(x) = \sin\sqrt{x}$ $fandg$ cannot be determined

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375. The inverse of the function $f : R\overrightarrow{x \in R : x < 1}$ given by $f(x) = \frac{e^x - e^{-x}}{e^x + e^{-x}}$, is $\frac{1}{2}\frac{\log(1+x)}{1-x}$ (b) $\frac{1}{2}\frac{\log(2+x)}{2-x}$ $\frac{1}{2}\frac{\log(1-x)}{1+x}$ (d) None of these

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376. If the function $f : (1,)\overrightarrow{1, \infty}$ is defined by $f(x) = 2^{x(x-1)}, then f^{-1}(x)$ is $\left(\frac{1}{2}\right)^{x(x-1)}$ (b) $\frac{1}{2}\left(1 + \sqrt{1 + 4(\log)_2 x}\right)$ $\frac{1}{2}\left(1 - \sqrt{1 + (\log)_2 x}\right.$ (d) not defined

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377. Let $f(x) = \frac{1}{1-x}$. Then, $\{f\,o\,(f\,o\,f)\}(x) = x$ for all $x \in R$ (b) x for all $x \in R - \{1\}$ (c) x for all $x \in R - \{0,\ 1\}$ (d) none of these

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378. If the function $f: R \rightarrow R$ be such that $f(x) = x - [x],$ where $[x]$ denotes the greatest integer less than or equal to $x,$ then $f^{-1}(x)$ is

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379. If $F: [1, \infty)\overrightarrow{2, \infty}$ is given by $f(x) = x + \frac{1}{x}, then f^{-1}(x)$ equals. $\frac{x + \sqrt{x^2 - 4}}{2}$ (b) $\frac{x}{1 + x^2}$ (c) $\frac{x - \sqrt{x^2 - 4}}{2}$ $1 + \sqrt{x^2 - 4}$

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380. Let $g(x) = 1 + x - [x] and f(x) = \{ -1, x < 00, x = 0 f, x > 0$. Then for all $x, f(g(x))$ is equal to (where [.] represents the greatest integer function). x (b) 1 (c) $f(x)$ (d) $g(x)$

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381. Let $f(x)=\frac{\alpha x}{(x+1)}, x \neq -1.$ The for what value of α is $f(f(x))=x$? $\sqrt{2}$ (b) $-\sqrt{2}$ (c) 1 (d) -1

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382. If $f:[2,\infty)\rightarrow(-\infty,4],$ where $f(x)=x(4-x)$ then find $f^{-1}(x)$

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383. If $f:\overrightarrow{R-1,1}$ is defined by $f(x)=-\frac{x|x|}{1+x^2}, thenf^{-1}(x)$ equals $\sqrt{\frac{|x|}{1-|x|}}$ (b) $-sgn(x)\sqrt{\frac{|x|}{1-|x|}}$ $-\sqrt{\frac{x}{1-x}}$ (d) none of these

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384. If $g(x)=x^2+x-2and\frac{1}{2}gof(x)=2x^2-5x+2,$ then which is not a possible $f(x)$? $2x-3$ (b) $-2x+2\,x-3$ (d) None of these

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385. If $f(x) = \sin^2 x$ and the composite function $g(f(x)) = |\sin x|$, then $g(x)$ is equal to $\sqrt{x-1}$ (b) $\sqrt{x}$ (c) $\sqrt{x+1}$ (d) $-\sqrt{x}$

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386. Let $f: R \to R$ be given by $f(x) = x^2 - 3$. Then, f^{-1} is given by $\sqrt{x+3}$ (b) $\sqrt{x}+3$ (c) $x+\sqrt{3}$ (d) none of these

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387. Let $f(x) = x^3$ be a function with domain {0, 1, 2, 3}. Then domain of f^{-1} is (a) {3, 2, 1, 0} (b) {0, -1, -2, -3} (c) {0, 1, 8, 27} (d) {0, -1, -8, -27}

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388. Let $f: R \rightarrow R$ be given by $f(x) = x^2 - 3$. Then, f^{-1} is given by $\sqrt{x+3}$ (b) $\sqrt{x} + 3$ (c) $x + \sqrt{3}$ (d) none of these

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389. Let $f: R \rightarrow R$ be given by $f(x) = \tan x$. Then, $f^{-1}(1)$ is $\frac{\pi}{4}$ (b) $\left\{n\pi + \frac{\pi}{4} : n \in Z\right\}$ (c) does not exist (d) none of these

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390. Let $A = \{1, 2, \ldots, n\}$ and $B = \{a, b\}$. Then number of subjections from A into B is nP2 (b) $2^n - 2$ (c) $2^n - 1$ (d) nC2

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391. If the set A contains 5 elements and the set B contains 6 elements, then the number of one-one and onto mappings from A to B is 720 (b)

120 (c) 0 (d) none of these

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392. If the set A contains 7 elements and the set B contains 10 elements, then the number of one-one functions from A to B is 10C7 (b) 10C7 x 7! (c) 7^{10} (d) 10^7

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393. Let $f: R - \left\{\frac{3}{5}\right\} \rightarrow R$ be defined by $f(x) = \frac{3x+2}{5x-3}$. Then

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Others

1. State with reasons whether $h: \{2, 3, 4, 5\} \rightarrow \{7, 9, 11, 13\}$ with $h = \{(2, 7), (3, 9), (4, 11), (5, 13)\}$

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2. Consider $f:\{1, 2, 3\} \to \{a, b, c\}$ and $g:\{a, b, c\} \to$ {apple, ball, cat} defined as $f(1) = a$, $f(2) = b$, $f(3) = c$, $g(a) =$ apple, $g(b) =$ ball and $g(c) =$ cat. Show that f, $g\, and\, gof$ are invertible. Find f^{-1}, g^{-1} and $(gof)^{-1}$ and show that $(gof)^{-1} = f^{-1} o\, g^{-1}$.

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3. Let $A = \{1, 2, 3, 4\}$; $B = \{3, 5, 7, 9\}$; $C = \{7, 23, 47, 79\}$ and $f: A \to B$, $g: B \to C$ be defined as $f(x) = 2x + 1$ and $g(x) = x^2 - 2$. Express $(gof)^{-1}$ and $f^{-1} o\, g^{-1}$ as the sets of ordered pairs and verify that $(gof)^{-1} = f^{-1} og^{-1}$.

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4. Let $A = \{x \in R: -1 \leq x \leq 1\} = B$ and $C = \{x \in R: x \geq 0\}$ and let $S = \{(x, y) \in A \times B: x^2 + y^2 = 1\}$ and

$S_0 = \{(x, y) \in A \times C : x^2 + y^2 = 1\}$. Then S defines a function from A to B (b) S_0 defines a function from A to C (c) S_0 defines a function from A to B (d) S defines a function from A to C

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5. The distinct linear functions which map [-1, 1] onto [0, 2] are $f(x) = x + 1, \ g(x) = -x + 1$ (b) $f(x) = x - 1, \ g(x) = x + 1$ (c) $f(x) = -x - 1, \ g(x) = x - 1$ (d) none of these

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6. Let $f : R \to R$ be defined as $f(x) = \begin{cases} 2x & \text{if } x > 3 \\ x^2 & \text{if } x < 1 \end{cases}$

find value of $f(-1) + f(4)$

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