MATHS

BOOKS - RS AGGARWAL MATHS (HINGLISH)

FUNCTIONS

Solved Examples

1. Let f : N $\rightarrow N : f(x) = 2x$ for all $x \in N$

Show that f is one -one and into.

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

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3. The modulus function $f: R \to R$, given by $f(x) = |x|$ is

A. One One

B. Many One

C. cant say

D. None of these

Answer: B

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4. Prove that the greatest integer function $f: R \to R$, 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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5. Show that the function $f: R_0 \to R_0$, 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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6. function $f: R \to R: f(x) = x^3$ is

A. One One

B. Many One

C. Not a function

D. None of these

Answer: A

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7. Show that the function $f: R \to R: f(x) = 3 - 4x$ is one-one onto and hence bijective.

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8. Show that the function $f: N \to N$ defined by

$$f(x) = \left\{ \begin{array}{ll} x - 1 & \text{if } x \text{ is even} \\ x + 1 & \text{if } x \text{is odd} \end{array} \right\}$$

is one-one and onto.

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9. Show that $f: N \to N$ defined by

$$f(n) = \left\{ \begin{array}{ll} \frac{n}{2} & \text{if } n \text{ is even} \\ \frac{n+1}{2} & \text{if } n \text{ is odd} \end{array} \right\}$$

is a many -one onto function

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10. Show that the signum function $f: R \to R$ defined by

$$f(x) = \left\{ \begin{array}{lll} -1 & \text{if} & x < 0 \\ 0 & \text{if} & x = 0 \\ 1 & \text{if} & x > 0 \end{array} \right\}$$

is neither one-one nor onto.

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11. Let $A = R - \{3\}$ and $B = R - [1]$. Consider the function $f: A \overrightarrow{B}$ 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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12. Let A and B be sets. Show that $f : A \times B, B \times A$ such that $f(a, b) = (b, a)$ is bijective function.

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13. Find the domain and range of the real function

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

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14. Find the domain and range of the real function defined by

$f(x) = \frac{1}{(1 - x^2).}$

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15. 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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16. 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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17. Find gof and fog, if $f: R \to R$and $g: R \to R$are given by $f(x) = \cos x$and $g(x) = 3x^2$. Show that $gof \neq fog$.

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18. Let R be the set of all real numbers let $f: R \to R: f(x) = \sin x$ and

$g: R \to R: g(x) = x^2$. Prove that g o f $\neq$ f o g

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

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20. If $f: R \to R$ is defined by $f(x) = x^2 - 3x + 2$, write $f\{f(x)\}$.

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21. Let $f: R \to R: f(x) = \left(3 - x^3\right)^{1/3}$. Find f o f

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22. Let $f: A \to B$, and let I_A and I_B be identity functions on A and B respectively. Prove that $(foI_A) = f$ and $(I_B of) = f$

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23. (Associativity) Let $f: A \to B, g: B \to C$ and $h: C \to .$ Then prove that (h o g) o f = h o (g o f)`

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

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

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

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25. Let $A = R - \left\{\frac{7}{5}\right\}$ and $B = R - \left\{\frac{3}{5}\right\}$

Let $f: A \to B: f(x) = \frac{3x+4}{5x-7}$ and $g: B \to A: g(x) = \frac{7x+4}{5x-3}$

Show that $(gof) = I_B$ and $(fog) = I_A$

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26. If functions $f: A \to B$ and $g: B \to A$ satisfy $gof = I_A$, then show that f is one-one and g is onto.

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27. Let $f: R \to R: f(x) = 4x + 3$ for all $x \in R$. Show that f is invertible and find f^{-1}

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

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29. Let R^+ be the set of all positive real numbers. Let $f: R^+ \to R^+ : f(x) = e^x$ for all $x \in R^+$. Show that f is invertible and hence find f^{-1}

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30. let $A = \left\{x: -\frac{\pi}{2} \leq x \leq \frac{\pi}{2}\right\}$ and $B = \{x: -1 \leq x \leq 1\}$. Show that the function $f: A \to B$ defined by, $f(x) = \sin x$ for all $x \in A$, is bijective . Hence, find a formula that defines f^{-1}

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31. Let $f: N \to Y : f(x) = x^2$ where $Y =$ range (f). Show that f is invertible and find f^{-1}

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32. Let $f:[-1,1] \to Y: f(x) = . \frac{x}{(x+2)}, x \neq -2$ and $Y =$ range (f). Show that f is invertible and find f^{-1}

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

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34. Let $f: R \to R: f(x) = 10x + 7$. Find the function $g: R \to R: gof = fog = I_g$

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35. Let $f: W \to W: f(n) = \left\{ \begin{matrix} (n+1)\ when\ n\ is\ even \\ (n-1)\ when\ n\ is\ odd \end{matrix} \right\}$

Show that f is invertible. Find f^{-1}

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36. Let $A = \{1, 2, 3\}$ and let $f: A \to A$ defined by

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

Find f^{-1} if it exists .

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Objective Questions

1. Let $f: \mathbb{N} \to \mathbb{N}: f(x) = 2x$ for all $x \in \mathbb{N}$ then f is

A. one-one and onto

B. one - one and into

C. many -one and onto

D. many -one and into

Answer: B

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2. $f: N \to N: f(x) = x^2 + x + 1$ is

A. one-one and onto

B. one - one and into

C. many -one and onto

D. many -one and into

Answer: B

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3. $f: R \to R: f(x) = x^2$ is

A. one-one and onto

B. one-one and into

C. many -one and onto

D. many -one and into

Answer: D

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4. Show that the function $f: R \to R: f(x) = x^3$ is one -one and onto.

A. one-one and onto

B. one-one and into

C. many - one and onto

D. many -one and into

Answer: A

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5. $f: R^+ \to R^+ : f(x) = e^x$ is

A. many - one and into

B. many - one and onto

C. one - one and into

D. one - one and onto

Answer: D

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6. $f: \left[\frac{-\pi}{2}, \frac{\pi}{2}\right] \to [-1, 1] : f(x) = \sin x$ is

A. one-one and into

B. one-one and onto

C. many-one and into

D. many-one and onto

Answer: B

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7. $f: R \to R: f(x) = \cos x$ is

A. one-one and into

B. one-one and onto

C. many- one and into

D. many-one and onto

Answer: C

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8. $f: C \to R: f(z) = |z|$ is

A. one-one and into

B. one -one and onto

C. many -one and into

D. many -one and onto

Answer: C

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9. Let $A = R - \{3\}$ and $B = R - \{1\}$. Then $f: A \to B: f(x) = \frac{(x-2)}{(x-3)}$ is

A. one-one and into

B. one -one and onto

C. many-one and into

D. many -one and onto

Answer: B

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10. Let $f: N \to N: f(n) = \begin{cases} \frac{1}{2}(n+1), & \text{when n is odd} \\ \frac{n}{2}, & \text{when n is even} \end{cases}$

Then f is

A. one-one and into

B. one-one and onto

C. many-one and into

D. many- one and into

Answer: D

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

A. one-one and onto

B. one-one and into

C. many-one and onto

D. many -one and onto

Answer: A

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12. Let $f: Q \to Q: f(x) = (2x + 3)$. Then $f^{-1}(y) = ?$

A. $(2x-3)$

B. $\frac{1}{(2y-3)}$

C. $\frac{1}{2}(y-3)$

D. none of these

Answer: C

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13. Let $f: R-\left\{-\frac{4}{3}\right\} \rightarrow R$be a function as $f(x)=\frac{4x}{3x+4}$. The inverse of f is map, $g: Ran \geq f \rightarrow R-\left\{-\frac{4}{3}\right\}$given by.(a) $g(y)=\frac{3y}{3-4y}$ (b) $g(y)=\frac{4y}{4-3y}$(c) $g(y)=\frac{4y}{3-4y}$ (d) $g(y)=\frac{3y}{4-3y}$

A. $\frac{4y}{(4-3y)}$

B. $\frac{4y}{(4y+3)}$

C. $\frac{4y}{(3y-4)}$

D. none of these

Answer: A

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14. Let $f: N \to X: f(x) = 4x^2 + 12x + 15$. Then $f^{-1}(y) = ?$

A. $\frac{1}{2}\left(\sqrt{y-4}+3\right)$

B. $\frac{1}{2}\left(\sqrt{y-6}-3\right)$

C. $\frac{1}{2}\left(\sqrt{y-4}+5\right)$

D. none of these

Answer: B

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15. If $f(x) = \dfrac{(4x+3)}{(6x+4)}, x \neq \dfrac{2}{3}$ then $(fof)(x) = ?$

A. x

B. $(2x-3)$

C. $\dfrac{4x-6}{3x+4}$

D. none of these

Answer: A

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16. If $f(x) = (x^2-1)$ and $g(x) = (2x+3)$ then $(gof)(x) = ?$

A. $(2x^2+3)$

B. $(3x^2+2)$

C. $(2x^2+1)$

D. none of these

Answer: C

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17. If $f\left(x+\frac{1}{x}\right)=x^2+\frac{1}{x^2}$ then $f(x)=$

A. x^2

B. $\left(x^2-1\right)$

C. $\left(x^2-2\right)$

D. none of these

Answer: C

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18. If $f(x)=\frac{1}{1-x}$, then $f(f(f(x)))$ is equal to

A. $\frac{1}{(1-3x)}$

B. $\frac{x}{(1+3x)}$

C. x

D. none of these

Answer: C

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19. Let $f: R \to R: f(x) = \left(3 - x^3\right)^{1/3}$. Find f o f

A. $x^{\frac{1}{3}}$

B. x

C. `(1-x^(1/3))

D. none of these

Answer: B

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20. If $f(x) = x^2 - 3x + 2$ then $(fof)(x) = ?$

A. x^4

B. $x^4 - 6x^3$

C. $x^4 - 6x^3 + 10x^2$

D. none of these

Answer: D

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

A. x

B. $2x$

C. $\frac{x}{2}$

D. $3x^2$

Answer: B

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22. 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 $(hog\, of)\left(\sqrt{\frac{\pi}{4}}\right)$.

A. 0

B. 1

C. $\frac{1}{x}$

D. $\frac{1}{2}\log. \frac{\pi}{4}$

Answer: A

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23. 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 gof as sets of ordered pairs.

A. $\{(3, 1), (1, 3), (3, 4)\}$

B. $\{(1, 3), (3, 1), (4, 3)\}$

C. $\{(3, 4), (4, 3), (1, 3)\}$

D. $\{(2, 5), (5, 2), (1, 5)\}$

Answer: B

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24. Let $f(x) = \sqrt{9 - x^2}.$ then , domain $(f) = ?$

A. $[-3, 3]$

B. $(-\infty,\ -3]$

C. $[3, \infty)$

D. $(-\infty, -3] \cup (4, \infty)$

Answer: A

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25. Let $f(x)\sqrt{\frac{x-1}{x-4}}$. Then dom (f) =?

A. $[1, 4)$

B. $[1, 4]$

C. $(-\infty, 4]$

D. $(-\infty, 1] \cup (4, \infty)$

Answer: D

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26. Let $f(x) = e^{\sqrt{x^2-1}}$. log (x-1) . Then dom (f) =?

A. $(-\infty, 1]$

B. $[-1, \infty)$

C. $(1, \infty)$

D. $(-\infty, -1] \cup (1, \infty)$

Answer: C

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27. Let $f(x) = \frac{x}{(x^2-1)}$ Then dom (f) =?

A. R

B. $R - \{1\}$

C. $R - \{-1\}$

D. $R - \{-1, 1\}$

Answer: D

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28. Let $f(x) = \frac{\sin^{-1} x}{x}$. then dom $(f) = ?$

A. $(-1, 1)$

B. $[-1, 1]$

C. $[-1, 1] - [0]$

D. none of these

Answer: C

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29. Let $f(x) = \cos^{-1} 2x$. Then dom (f)=?

A. $[-1, 1]$

B. $\left[\frac{-1}{2}, \frac{1}{2}\right]$

C. $\left[\frac{-\pi}{2}, \frac{\pi}{2}\right]$

D. $\left[\frac{-\pi}{4}, \frac{\pi}{4}\right]$

Answer: B

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30. Let $f(x) = \cos^{-1}(3x - 1)$. Then , dom (f)=?

A. $\left(0, \frac{2}{3}\right)$

B. $\left[0, \frac{2}{3}\right]$

C. $\left[\frac{-2}{3}, \frac{2}{3}\right]$

D. none of these

Answer: B

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31. Let $f(x) = \sqrt{\cos x}$. Then dom (f) =?

A. $\left[0. \frac{\pi}{2}\right]$

B. $\left[\frac{3\pi}{2}, 2\pi\right]$

C. $\left[0, \frac{\pi}{2}\right] \cup \left[\frac{3\pi}{2}, 2\pi\right]$

D. none of these

Answer: C

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32. Let $f(x) = \sqrt{\log\left(2x - x^2\right)}$. Then dom (f)=?

A. $(0, 2)$

B. $[1, 2]$

C. $(-\infty, 1]$

D. $\{1\}$

Answer: D

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33. Let $f(x) = x^2$. Then dom (f) and range (f) are respectively

A. R and R

B. R^+ and R^+

C. R and R^+

D. R and $R - \{0\}$

Answer: C

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34. Let $f(x) = x^3$. Then, dom (f) and range (f) are respectively

A. R and R

B. R^+ and R^+

C. R and R^+

D. R^+ and R

Answer: A

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35. Let $f(x) = \log(1 - x) + \sqrt{x^2 - 1}$. Then dom (f)=?

A. $(1, \infty)$

B. $(-\infty, -1]$

C. $[-1, 1]$

D. $(0, 1)$

Answer: B

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36. Let $f(x) = \frac{1}{(1-x^2).}$ Then range (f)=?

A. $(-\infty, 1]$

B. $(-\infty, 0) \cup [1, \infty)$

C. $[-1, 1]$

D. none of these

Answer: B

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37. Let $f(x) = \frac{x^2}{(1+x^2)}$ .Then range (f) =?

A. $[1, \infty)$

B. $[0, 1)$

C. $[-1, 1]$

D. $(0, 1]$

Answer: B

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38. The range of $f(x) = x + \frac{1}{x}$ is

A. $[-2, 2]$

B. $[2, \infty)$

C. $(-\infty, -2]$

D. $(-\infty, -2] \cup [2, \infty)$

Answer: D

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39. The range of $f(x) = a^x, \quad \text{where} \quad a > 0$ is

A. $]-\infty, 0]$

B. $]-\infty, 0)$

C. $[0, \infty)$

D. $(0, \infty)$

Answer: D

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Exercise 2 A

1. Define a functions . What do you mean by the domain and range of a function ? Give examples.

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2. Define each of the following:

(i) injective function (ii) surjective function

(iii) bijective function (iv) many -one function

(v) into function

`Give an example of each type of functions.

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3. Give an example of a function which is

(i) one-one but not onto (ii) one-one and onto

(*iii*)neither one-one nor onto (iv) onto but not one-one

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4. Let $f: R \to R$ be defined by

$$f(x) = \left\{ \begin{array}{c} 3x - 1 \, when \, x > 3 \\ x^2 - 2 \, when \, -2 \leq x \leq 3 \\ 2x + 3 \, when \, x < -2 \end{array} \right\}$$

Find (i) $f(2)$ (ii) $f(4)$ (iii) $f(-1)$ (iv) $f(-3)$

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5. show that the function $f: R \to R: f(x) = 1 + x^2$ is many -one into .

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6. show that the function $f: R \to R: f(x) = x^4$ is many -one and into

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7. show that the function $f: R \to Rf: (x) = x^5$ is one-one and onto .

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8. Consider a function $f: \left[0, \frac{\pi}{2}\right] \to R$ given by $f(x) = \sin x$ and $g: \left[0, \frac{\pi}{2}\right] \to R$ 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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9. show that the function

$(i) f: N \to N: f(x) = x^2$ is one-one into

(ii) $f: Z \to Z: f(x) = x^2$ is many -one into .

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10. Show that the function (i) $f: N \to N: f(x) = x^3$ is one -one into

(ii) $f: Z \to Z: f(x) = x^3$ is one-one into

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11. Show that the function $f: R \to R: f(x) = \sin x$ is neither one-one nor onto

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12. 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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13. show that the function $f: N \to Z$ defined by

$$f(n) = \begin{cases} \frac{1}{2}(n-1), & \text{when n is odd} \\ -\frac{1}{2}n, & \text{when n is even} \end{cases}$$

is both one-one and onto

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14. find the domain and range of the function

$f: R \to R: f(x) = x^2 + 1$

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15. Which of the following relations are functions ? Give reasons . In case of a functions find its domain and range .

(i) $f = \{(-1, 2), (1, 8)(2, 11), (3, 14)\}$

(ii) $g = \{(1, 1), (1, -1), (4, 2), (9, 3), (16, 4)\}$

(iii) $h = \{(a, b), (b, c), (c, d), (d, c)\}$

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16. Find the domain and range of the real function defined by $f(x) = \frac{x^2}{(1+x^2)}$

Show that f is many -one

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17. Show that the function

$$f: R \to R: f(x) = \left\{ \begin{array}{ll} -1 & \text{if } x \text{ is irrational} \\ 1 & \text{if } x \text{ is rational} \end{array} \right\}$$

is many-one into.

Find $(i) f\left(\frac{1}{2}\right)$ $(ii) f(\sqrt{2})$ $(iii) f(\pi)$ $(iv) f(2+\sqrt{3})$

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Exercise 2 B

1. Let $A = \{1, 2, 3, 4\}$. Let $f: A \to A$ and $g: A \to A$

defined by $f: = \{(1, 4), (2, 1), (3, 3), (4, 2)\}$ and

$g = \{(1, 3), (2, 1), (3, 2), (4, 4)\}$

Find (i) g o f (ii) f o g (iii) f o f .

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2. 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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3. Let $f: R \to R: f(x) = x^2$ and $g: R \to R: g(x) = (x + 1)$

Show that $(gof) \neq (fog)$

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4. Let

$f: R \to R: f(x) = (2x + 1)$ and $g: R \to R: g(x) = \left(x^2 - 2\right)$

Write down the formulae for

(i) $(gof)(ii)(fog)(iii)(fof)(iv)(gof)$

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5. Let

$f: R \to R: f(x) = \left(x^2 + 3x + 1\right)$ and $g: R \to R: g(x) = (2x - 3).$

Write down the formulae for

(i) g o f (ii) f o g (iii) g o g

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6. Let $f: R \to R: f(x) = |x|$ prove that f o f =f

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7. Let $f: R \to R: f(x) = x^2, g: R \to R: g(x) = \tan x$, and $h: R \to R: h(x) =$ log x find a formula for ho(gof) Show that `[ho(gof)] sqrt(π/(4)) = 0

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8. Let $f: R \to R: f(x) = (2x - 3)$ and $g: R \to R: g(x) = \frac{1}{2}(x + 3)$ show that (f o g) $= I_R = (gof)$

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

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

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

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

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11. If f be a greatest integer function and g be an absolute value function, find the value of $(f \circ g)\left(-\frac{3}{2}\right) + (g \circ f)\left(\frac{4}{3}\right)$.

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12. Let

$f: R \to R: f(x) = x^2 + 2 \text{and} \quad g: R \to R: g(x) = \frac{x}{x-1}, x \neq 1.$

Find f o g and g o f and hence find (f o g) (2) and (g o f) (-3)

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Exercise 2 C

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

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2. Prove that the function $f: N \to N: f(x) = 3x$ is one-one and into.

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

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4. show that the function

$(i) f: N \to N: f(x) = x^2$ is one-one into

(ii) $f: Z \to Z: f(x) = x^2$ is many -one into .

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5. Show that the fucntion $f: R \to R: f(x) = x^4$ is neither one-one not noto.

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6. Show that the function

(i) $f: N \to N: f(x) = x^3$ is one -one into

(ii) $f: Z \to Z: f(x) = x^3$ is oen-one into

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7. Show that the function $f: R_0 \to R_0$, 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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8. show that the function $f: R \to R: f(x) = 1 + x^2$ is many -one into .

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9. Let $f: R \to R: f(x) = \frac{2x - 7}{4}$ be an invertible function . Find f^{-1}

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10. Let $f: R \to R: f(x) = 10x + 3$ .Find f^{-1}

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11. $f: R \to R: f(x) = \begin{cases} 1 & \text{is x is rational} \\ -1, & \text{if x is rational} \end{cases}$

show that f is many -one and into.

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12. If $f(x) = x + 7$ and $g(x) = x - 7, x \in R$ find (fog) (7).

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13. Let $f: R \to R: f(x) = x^2$ and $g: R \to R: g(x) = (x + 1)$

Show that $(gof) \neq (fog)$

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14. Let $f: R \to R: f(x) = \left(3 - x^3\right)^{1/3}$. Find f o f

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15. If $f: R \to R$ is defined by $f(x) = 3x + 2$, find $f(f(x))$.

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16. Let $f: \{1,\ 3, 4\} \to \{1,\ 2,\ 5\}$ and $g: \{1,\ 2,\ 5\} \to \{1,\ 3\}$ 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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17. Let $A = \{1, 2, 3, 4)$ and $f = \{(1, 4), (2, 1), (3, 3), (4, 2)\}$. Write down (f o f)

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

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19. Let $f: R \to R: f(x) = 10x + 7.$ Find the function $g: R \to R: gof = fog = I_g$

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20. 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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Exercise 2 D

1. Let $A = \{2, 3, 4, 5\}$ and $B = \{7, 9, 11, 13\}$ and

let f = {(2,7),(3,9) ,(4,11),(5,13)}

Show that f is invertible and find f^{-1}

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2. show that the function $f: R \to R: f(x) = 2x + 3$ is invertible and find f^{-1}

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3. Let $f: Q \to Q: f(x) = 3x - 4$ show tha t f is invertible and find f^{-1}

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4. Let $f: R \to R: f(x) = \frac{1}{2}(3x + 1)$ .Show that f is invertible and find f^{-1}

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5. 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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6. show that the function f in A = R - $\{\frac{2}{3}\}$ defined as f(x) = $\frac{4x + 3}{6x - 4}$ is one one and onto. Hence find f^{-1}

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7. show that the function f on $A = R - \left\{\frac{-4}{3}\right\}$ onto itself defined by

$f(x) = \frac{4x}{(3x+4)}$ is one-one and onto. Hence find f^{-1}

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

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

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

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11. Let f and g be two functions from R into R defined by f(x) $= |x| + x$ and $g(x) = x \quad \text{for all} \quad x \in R$. Find f o g and g o f

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