



MATHS

BOOKS - VIKRAM PUBLICATION (ANDHRA PUBLICATION)

FUNCTIONS

Solved Problems

1. $f: R - \{0\} \rightarrow R$ is defined as $f(x) = x + \frac{1}{x}$ then show that
- $$(f(x))^2 = f(x^2) + f(1)$$



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2. If the function f is defined by

$$f(x) = \begin{cases} 3x - 2, & x > 3 \\ x^2 - 2, & -2 \leq x \leq 2 \\ 2x + 1, & x < -3 \end{cases} \text{ then find the values, if exist, of}$$

$f(-2), f(-4), f(-7)$.

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3. If $A = \left\{0, \frac{\pi}{6}, \frac{\pi}{4}, \frac{\pi}{3}, \frac{\pi}{2}\right\}$ and $f: A \rightarrow B$ is a surjection defined by $f(x) = \cos x$ then find B.

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4. $f: \mathbb{R} \rightarrow \mathbb{R}$ is a function defined by $f(x) = \frac{e^{|x|} - e^{-x}}{e^x + e^{-x}}$. Then f is:

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5. Determine whether the function $f: \mathbb{R} \rightarrow \mathbb{R}$ defined by

$$f(x) = \begin{cases} x, & \text{if } x > 2 \\ 5x - 2, & \text{if } x \leq 2 \end{cases}$$

is an injection or a surjection or a bijection

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6. Find the domain of definition of the function $y(x)$, given by the equation $2^x + 2^y = 2$.



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7. If $f: R \rightarrow R$ is defined as $f(x + y) = f(x) + f(y) \forall x, y \in R$ and $f(1) = 7$, then find $\sum_{r=1}^n f(r)$.



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8. If $f(x) = \frac{\cos^2 x + \sin^4 x}{\sin^2 x + \cos^4 x} \forall x \in R$ then show that $f(2012) = 1$.



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9. If $f: R \rightarrow R, g: R \rightarrow R$ are defined by

$f(x) = 4x - 1$ and $g(x) = x^2 + 2$ then find

$(g \circ f)(x)$



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10. If $f: R \rightarrow R, g: R \rightarrow R$ are defined by

$f(x) = 4x - 1$ and $g(x) = x^2 + 2$ then find

$(g \circ f)\left(\frac{a+1}{4}\right)$



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11. If $f: R \rightarrow R, g: R \rightarrow R$ are defined by

$f(x) = 4x - 1$ and $g(x) = x^2 + 2$ then find

$(f \circ f)(x)$



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12. If $f: R \rightarrow R, g: R \rightarrow R$ are defined by

$$f(x) = 4x - 1 \text{ and } g(x) = x^2 + 2 \text{ then find}$$

$$go(fof)(0)$$



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13. If $f: [0, 3] \rightarrow [0, 3]$ is defined by:

$$f(x) = \begin{cases} 1 + x & 0 \leq x \leq 2 \\ 3 - x & 2 < x \leq 3 \end{cases}, \text{ then show that } f[0, 3] \subseteq [0, 3] \text{ and find}$$

fof.



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14. If $f, g: R \rightarrow R$ are defined

$$f(x) = \begin{cases} 0 & \text{if } x \in Q \\ 1 & \text{if } x \notin Q \end{cases}, g(x) = \begin{cases} -1 & \text{if } x \in Q \\ 0 & \text{if } x \notin Q \end{cases}$$

then find $(fog)(\pi) + (gof)(e)$.



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15. Let $A = \{1, 2, 3\}$, $B = \{a, b, c\}$, $C = \{p, q, r\}$. If $f: A \rightarrow B$, $g: B \rightarrow C$ are defined by $f = \{(1, a), (2, c), (3, b)\}$, $g = \{(a, q), (b, r), (c, p)\}$ then show that $f^{-1} \circ g^{-1} = (g \circ f)^{-1}$.

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16. If $f: Q \rightarrow Q$ is defined by $f(x) = 5x + 4$, find f^{-1} .

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17. Find the domain of the real valued function: $f(x) = \frac{1}{6x - x^2 - 5}$

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18. Find the domains of the real valued function

$$f(x) = \frac{1}{\sqrt{x^2 - a^2}}, (a > 0)$$



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19. Find the domain of the real function $f(x) = \sqrt{(x+2)(x-3)}$



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20. Find the domain of the real valued function

$$f(x) = \sqrt{(x-\alpha)(\beta-x)}, (\theta < \alpha < \beta).$$



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21. Find the domain of the real function $f(x) = \sqrt{2-x} + \sqrt{1+x}$



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22. Find the domain of $f(x) = \sqrt{x^2-1} + \frac{1}{\sqrt{x^2-3x+2}}$



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23. The domain of the real function f defined by $f(x) = \frac{1}{\sqrt{|x| - x}}$ is

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24. Find the domains for the following real valued functions:

(i) $f(x) = \sqrt{4x - x^2}$

(ii) $f(x) = \sqrt{2 - x} + \sqrt{1 + x}$

(iii) $f(x) = \frac{\sqrt{3 + x} + \sqrt{3 - x}}{x}$

(iv) $f(x) = \sqrt{|x| - x},$

(v) $f(x) = \sqrt{x - |x|}$

(vi) $f(x) = \sqrt{|x| - x}$

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25. If $f = \{(4, 5), (5, 6), (6, -4)\}$ and $g = \{(4, -4), (6, 5), (8, 5)\}$

then find:

- (i) $f+g$, (ii) $f-g$, (iii) $2f+4g$, (iv) $f+4$, (v) fg , (vi) f/g , (vii) $|f|$, (viii) \sqrt{f} , (ix) f^2 ,
(x) f^3



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26. If $f = \{(4, 5), (5, 6), (6, -4)\}$ and $g = \{(4, -4), (6, 5), (8, 5)\}$

then find:

- (i) $f+g$, (ii) $f-g$, (iii) $2f+4g$, (iv) $f+4$, (v) fg , (vi) f/g , (vii) $|f|$, (viii) \sqrt{f} , (ix) f^2 ,
(x) f^3



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27. If $f = \{(4, 5), (5, 6), (6, -4)\}$ and $g = \{(4, -4), (6, 5), (8, 5)\}$

then find:

(i) $f+g$, (ii) $f-g$, (iii) $2f+4g$, (iv) $f+4$, (v) fg , (vi) f/g , (vii) $|f|$, (viii) \sqrt{f} , (ix) f^2 ,

(x) f^3



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28. If $f = \{(4, 5), (5, 6), (6, -4)\}$ and $g = \{(4, -4), (6, 5), (8, 5)\}$

then find:

(i) $f+g$, (ii) $f-g$, (iii) $2f+4g$, (iv) $f+4$, (v) fg , (vi) f/g , (vii) $|f|$, (viii) \sqrt{f} , (ix) f^2 ,

(x) f^3



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29. If $f = \{(4, 5), (5, 6), (6, -4)\}$ and $g = \{(4, -4), (6, 5), (8, 5)\}$

then find:

(i) $f+g$, (ii) $f-g$, (iii) $2f+4g$, (iv) $f+4$, (v) fg , (vi) f/g , (vii) $|f|$, (viii) \sqrt{f} , (ix) f^2 ,

(x) f^3



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30. If $f = \{(4, 5), (5, 6), (6, -4)\}$ and $g = \{(4, -4), (6, 5), (8, 5)\}$

then find:

- (i) $f+g$, (ii) $f-g$, (iii) $2f+4g$, (iv) $f+4$, (v) fg , (vi) f/g , (vii) $|f|$, (viii) \sqrt{f} , (ix) f^2 ,
(x) f^3



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31. If $f = \{(4, 5), (5, 6), (6, -4)\}$ and $g = \{(4, -4), (6, 5), (8, 5)\}$

then find:

- (i) $f+g$, (ii) $f-g$, (iii) $2f+4g$, (iv) $f+4$, (v) fg , (vi) f/g , (vii) $|f|$, (viii) \sqrt{f} , (ix) f^2 ,
(x) f^3



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32. If $f = \{(4, 5), (5, 6), (6, -4)\}$ and $g = \{(4, -4), (6, 5), (8, 5)\}$

then find:

(i) $f+g$, (ii) $f-g$, (iii) $2f+4g$, (iv) $f+4$, (v) fg , (vi) f/g , (vii) $|f|$, (viii) \sqrt{f} , (ix) f^2 ,

(x) f^3



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33. If $f = \{(4, 5), (5, 6), (6, -4)\}$ and $g = \{(4, -4), (6, 5), (8, 5)\}$

then find:

(i) $f+g$, (ii) $f-g$, (iii) $2f+4g$, (iv) $f+4$, (v) fg , (vi) f/g , (vii) $|f|$, (viii) \sqrt{f} , (ix) f^2 ,

(x) f^3



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34. If $f = \{(4, 5), (5, 6), (6, -4)\}$ and $g = \{(4, -4), (6, 5), (8, 5)\}$

then find:

(i) $f+g$, (ii) $f-g$, (iii) $2f+4g$, (iv) $f+4$, (v) fg , (vi) f/g , (vii) $|f|$, (viii) \sqrt{f} , (ix) f^2 ,

(x) f^3



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35. Find the domain and range of the real valued function

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



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



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37. Find the range of the real valued function $f(x) = \sqrt{9 - x^2}$.



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38. If $f(x) = x^2$ and $g(x) = |x|$, find the functions.

(i) $f + g$



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39. If $f(x) = x^2$ and $g(x) = |x|$ then find the values of:

(i) $f+g$, (ii) $f-g$, (iii) fg , (iv) $2f$, (v) f^2 , (vi) $f+3$



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40. If $f(x) = x^2$ and $g(x) = |x|$, find the functions.

(ii) fg



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41. If $f(x) = x^2$ and $g(x) = |x|$ then find the values of:

(i) $f+g$, (ii) $f-g$, (iii) fg , (iv) $2f$, (v) f^2 , (vi) $f+3$



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42. If $f(x) = x^2$ and $g(x) = |x|$, then find (v) f^2



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43. If $f(x) = x^2$ and $g(x) = |x|$, then find (vi) $f + 3$

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44. Determine whether the function $f(x) = a^x - a^{-x} + \sin x$ is even or odd.

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45. Determine whether the function $f(x) = x \left(\frac{e^x - 1}{e^x + 1} \right)$ is even or odd

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46. Determine whether the function $f(x) = \log(x + \sqrt{x^2 + 1})$ is even or odd.



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47. Find the domain of the following real valued functions:

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

$$(ii) f(x) = \frac{1}{\sqrt{2 - |x|}}$$

$$(iii) f(x) = \frac{1}{\sqrt{|x|^2 - |x| - 2}}$$



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48. Find the domains of the real valued function

$$f(x) = \log(x - [x])$$



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49. Find the domains of the real valued function

$$f(x) = \sqrt{\log_{10}\left(\frac{3-x}{x}\right)}$$



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50. Find the domains of the real valued function

$$f(x) = \sqrt{x+2} + \frac{1}{\log_{10}(1-x)}$$

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51. Find the domains of the real valued function

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

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52. If $f: A \rightarrow B$ and $g: B \rightarrow C$ are two injective functions the prove that $g \circ f: A \rightarrow C$ is also an injection.

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53. If $f: A \rightarrow B$ and $g: B \rightarrow C$ are two injective functions the prove that $gof: A \rightarrow C$ is also an injection.



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54. If $f: A \rightarrow B$ and $g: B \rightarrow C$ are two bijective functions then prove that $gof: A \rightarrow C$ is also a bijection.



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55. If $f: A \rightarrow B$ and $g: B \rightarrow C$ are two injective functions the prove that $gof: A \rightarrow C$ is also an injection.



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56. If $f: A \rightarrow B$ and $g: B \rightarrow C$ and $h: C \rightarrow D$ are functions then prove that $h \circ (gof) = (hog)$ of



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57. If $f: A \rightarrow B$ is a function and I_A, I_B are identity functions on A, B respectively then prove that $f \circ I_A = f = I_B \circ f$



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58. Let A and B be two non-empty sets. If

$f: A \rightarrow B$ is a bijection, then $f^{-1}: B \rightarrow A$ is also a bijection.



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59. If $f: A \rightarrow B$ is a bijective function then prove that

(ii) $f^{-1} \circ f = I_A$.



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60. If $f: A \rightarrow B$ and $g: B \rightarrow A$ are two functions such that $gof = I_A$ and $fog = I_B$ then $g = f^{-1}$.



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61. If $f: A \rightarrow B, g: B \rightarrow C$ are two bijective functions then P.T
 $(gof)^{-1} = f^{-1}og^{-1}$



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Textual Exercises Exercise 1 A

1. If the function f is defined by

$$f(x) = \begin{cases} x + 2 & x > 1 \\ 2 & -1 \leq x \leq 1 \\ x - 1 & -3 < x < -1 \end{cases}, \text{ then find the value of:}$$

(i) $f(3)$, (ii) $f(0)$, (iii) $f(-1.5)$, (iv) $f(2) + f(-2)$, (v) $f(-5)$



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2. If the function f is defined by

$$f(x) = \begin{cases} x + 2 & x > 1 \\ 2 & -1 \leq x \leq 1 \\ x - 1 & -3 < x < -1 \end{cases}, \text{ then find the value of:}$$

(i) $f(3)$, (ii) $f(0)$, (iii) $f(-1.5)$, (iv) $f(2) + f(-2)$, (v) $f(-5)$



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3. If the function f is defined by

$$f(x) = \begin{cases} x + 2 & x > 1 \\ 2 & -1 \leq x \leq 1 \\ x - 1 & -3 < x < -1 \end{cases}, \text{ then find the value of:}$$

(i) $f(3)$, (ii) $f(0)$, (iii) $f(-1.5)$, (iv) $f(2) + f(-2)$, (v) $f(-5)$



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4. If the function f is defined by

$$f(x) = \begin{cases} x + 2 & x > 1 \\ 2 & -1 \leq x \leq 1 \\ x - 1 & -3 < x < -1 \end{cases}, \text{ then find the value of:}$$

(i) $f(3)$, (ii) $f(0)$, (iii) $f(-1.5)$, (iv) $f(2) + f(-2)$, (v) $f(-5)$



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5. If the function f is defined by

$$f(x) = \begin{cases} x + 2 & x > 1 \\ 2 & -1 \leq x \leq 1 \\ x - 1 & -3 < x < -1 \end{cases}, \text{ then find the value of:}$$

(i) $f(3)$, (ii) $f(0)$, (iii) $f(-1.5)$, (iv) $f(2) + f(-2)$, (v) $f(-5)$



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6. If $f: \mathbb{R} - \{0\} \rightarrow \mathbb{R}$ is defined by $f(x) = x^3 - \frac{1}{x^3}$, then S.T
 $f(x) + f(1/x) = 0$.



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7. If $f: \mathbb{R} \rightarrow \mathbb{R}$ is defined by $f(x) = \frac{1 - x^2}{1 + x^2}$ then show that
 $f(\tan \theta) = \cos 2\theta$.



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8. If $f: R - (\pm 1) \rightarrow R$ is defined by $f(x) = \log \left| \frac{1+x}{1-x} \right|$, then show that $f\left(\frac{2x}{1+x^2}\right) = 2f(x)$.



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9. If $A = \{-2, -1, 0, 1, 2\}$ and $f: A \rightarrow B$ is a surjection defined by $f(x) = x^2 + x + 1$ then find B.



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10. If $A = \{1, 2, 3, 4\}$ and $f: A \rightarrow R$ is a function defined by $f(x) = \frac{x^2 - x + 1}{x + 1}$ then find the range of f.



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11. If $f(x + y) = f(xy) \forall x, y \in R$ then prove that f is a constant function.

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12. If $A = \{x: -1 \leq x \leq 1\}$, $f(x) = x^2$ and $g(x) = x^3$, which of the following functions are onto? (i) $f: A \rightarrow A$

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13. If $A = \{x: -1 \leq x \leq 1\}$, $g(x) = x^3$, which of the following are onto?

(ii) $g: A \rightarrow A$

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14. Which of the following are one-one, onto (or) bijections? Justify your answer.

(i) $f: R \rightarrow R, f(x) = \frac{2x + 1}{3}$

(ii) $f: N \rightarrow N, f(x) = 2x + 3$

(iii) $f: [0, \infty) \rightarrow [0, \infty), f(x) = x^2$

(iv) $f: R \rightarrow R, f(x) = x^2$

(v) $f: R \rightarrow (0, \infty), f(x) = 5^x$

(vi) $f: (0, \infty) \rightarrow R, f(x) = \log_e^x$

(vii) $f: R \rightarrow R, f(x) = \begin{cases} x & \text{if } x > 2 \\ 5x - 2 & \text{if } x \leq 2 \end{cases}$



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15. $f: R \rightarrow (0, \infty)$ defined by $f(x) = 2^x$. then $f^{-1}(x)$



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16. Determine whether the function $f: (0, \infty) \rightarrow R$ defined by $f(x) \log_e x$ is one one (or) onto (or) bijection.



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17. Determine whether the function $f: \mathbb{R} \rightarrow [0, \infty)$ defined by $f(x) = x^2$ is one one (or) onto (or) bijection.

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18. If $f: [0, \infty) \rightarrow \mathbb{R}$ defined by $f(x) = x^2$, then f is

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19. $f: \mathbb{R} \rightarrow \mathbb{R}$ defined by $f(x) = x^2$. then $f^{-1}(x)$

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20. Is $g = \{(1, 1), (2, 3), (3, 5), (4, 7)\}$ is a function from $A = \{1, 2, 3, 4\}$. to $B = \{1, 3, 5, 7\}$? If this is given by the formula $g(x) = ax + b$, then find a and b .

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21. If the function $f: R \rightarrow R$ defined by $f(x) = \frac{3^x + 3^{-x}}{2}$, then S.T
 $f(x + y) + f(x - y) = 2f(x)f(y)$.



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22. If the function $f: R \rightarrow R$ defined by $f(x) = \frac{4^x}{4^x + 2}$, then show
that $f(1 - x) = 1 - f(x)$, and hence deduce the value of
 $f\left(\frac{1}{4}\right) + 2f\left(\frac{1}{2}\right) + f\left(\frac{3}{4}\right)$.



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23. If the function $f: \{-1, 1\} \rightarrow \{0, 2\}$, defined by $f(x) = ax + b$ is a
surjection, then find a & b.



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24. If $f(x) = \cos(\log x)$, then show that

$$f\left(\frac{1}{x}\right) \cdot f\left(\frac{1}{y}\right) - \frac{1}{2} \left[f\left(\frac{x}{y}\right) + f(xy) \right] = 0$$

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Textual Exercises Exercise 1 B

1. If $f(x) = e^x$ and $g(x) = \log_e x$, then show that $f \circ g = g \circ f$ and find f^{-1} and g^{-1} .

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2. If $f(y) = \frac{y}{\sqrt{1-y^2}}$, $g(y) = \frac{y}{\sqrt{1+y^2}}$ then show that $(f \circ g)(y) = y$

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3. If $f: R \rightarrow R$ and $g: R \rightarrow R$ are defined by $f(x) = 2x^2 + 3$ and $g(x) = 3x - 2$, then find:

(i) $(f \circ g)(x)$, (ii) $(g \circ f)(x)$, (iii) $(f \circ f)(0)$, (iv) $(g \circ (f \circ f))(3)$



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4. If $f: R \rightarrow R, g: R \rightarrow R$ are defined by

$f(x) = 2x^2 + 3$ and $g(x) = 3x - 2$, then find

$(g \circ f)(x)$



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5. If $f: R \rightarrow R, g: R \rightarrow R$ are defined by

$f(x) = 2x^2 + 3$ and $g(x) = 3x - 2$, then find

$(f \circ f)(0)$



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6. If $f: R \rightarrow R, g: R \rightarrow R$ are defined by $f(x) = 2x^2 + 3$ and $g(x) = 3x - 2$, then find $go(fof)(3)$.



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7. If $f: R \rightarrow R, g: R \rightarrow R$ are defined by $f(x) = 3x - 1, g(x) = x^2 + 1$, then find $(fof)(x^2 + 1)$



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8. If $f: R \rightarrow R, g: R \rightarrow R$ are defined by $f(x) = 3x - 1, g(x) = x^2 + 1$ then find (i) $(fog)(2)$



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9. If $f: R \rightarrow R, g: R \rightarrow R$ are defined by

$$f(x) = 3x - 1, g(x) = x^2 + 1, \text{ then find}$$

$g \circ f(2a - 3)$

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10. If $f(x) = 1/x, g(x) = \sqrt{x}$ for all $x \in (0, \infty)$, then find $(g \circ f)(x)$.

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11. If $f(x) = 2x - 1, g(x) = \frac{x + 1}{2}$ for all $x \in R$, find $(g \circ f)(x)$

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12. If $f(x) = 2, g(x) = x^2, h(x) = 2x$ then find $(f \circ g \circ h)(x)$

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13. Find the inverse of the following functions:

If $a, b \in \mathbb{R}$, $f: \mathbb{R} \rightarrow \mathbb{R}$ defined by $f(x) = ax + b$ ($a \neq 0$),

(ii) $f: \mathbb{R} \rightarrow (0, \infty)$ defined by $f(x) = \log_2 x$



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14. $f: \mathbb{R} \rightarrow (0, \infty)$ defined by $f(x) = 5^x$. then $f^{-1}(x)$



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15. $f: \mathbb{R} \rightarrow (0, \infty)$ defined by $f(x) = \log_2(x)$. then $f^{-1}(x)$



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16. If $f(x) = 1 + x + x^2 + \dots$ for $|x| < 1$ then show that

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



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17. If $f: [1, \infty) \rightarrow [1, \infty)$ is defined by $f(x) = 2^{x(x-1)}$ then find $f^{-1}(x)$.

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18. If $f(x) = \frac{x-1}{x+1}$, $x \neq \pm 1$, show that $f \circ f^{-1}(x) = x$.

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19. If
 $A = \{1, 2, 3\}$, $B = (\alpha, \beta, \gamma)$, $C = (p, q, r)$ and $(f: A \rightarrow B, g: B \rightarrow C)$
are defined by $f = \{(1, \alpha), (2, \gamma), (3, \beta)\}$, $g = \{(\alpha, q), (\gamma, p)\}$ then
show that f and g are bijective functions and $(g \circ f)^{-1} = f^{-1} \circ g^{-1}$.

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20. If $f: R \rightarrow R$, $g: R \rightarrow R$ defined by $f(x) = 3x - 2$, $g(x) = x^2 + 1$,

then find:

(i) $(gof^{-1})(2)$, (ii) $(gof)(x - 1)$



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21. If $f: R \rightarrow R$, $g: R \rightarrow R$ defined by $f(x) = 3x - 2$, $g(x) = x^2 + 1$,

then find:

(i) $(gof^{-1})(2)$, (ii) $(gof)(x - 1)$



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22.

Let

$f = \{(1, a), (2, c), (4, d), (3, b)\}$ and $g^{-1} = \{(2, a), (4, b), (1, c), (3, d)\}$

then show that $(gof)^{-1} = f^{-1}og^{-1}$.



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23. If $f: R \rightarrow R, g: R \rightarrow R$ are defined by

$$f(x) = 2x - 3, g(x) = x^3 + 5 \text{ then find } (f \circ g)^{-1}(x)$$



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24. Let $f(x) = x^2, g(x) = 2^x$. Then solve the equation

$$(f \circ g)(x) = (g \circ f)(x).$$



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25. If $f(x) = \frac{x+1}{x-1}, (x \neq \pm 1)$ then find $(f \circ f \circ f)(x)$ and $(f \circ f \circ f \circ f)(x)$.



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Textual Exercises Exercise 1 C

1. Find the domains of the followings real valued functions:

$$(i) f(x) = \frac{2x^2 - 5x + 7}{(x - 1)(x - 2)(x - 3)}$$

$$(ii) f(x) = \frac{1}{(x^2 - 1)(x + 3)}$$

$$(iii) f(x) = \frac{1}{6x - x^2 - 5},$$

$$(iv) f(x) = \frac{1}{x + |x|}$$



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2. Find the domains of the followings real valued functions:

$$(i) f(x) = \frac{2x^2 - 5x + 7}{(x - 1)(x - 2)(x - 3)}$$

$$(ii) f(x) = \frac{1}{(x^2 - 1)(x + 3)}$$

$$(iii) f(x) = \frac{1}{6x - x^2 - 5},$$

$$(iv) f(x) = \frac{1}{x + |x|}$$



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3. Find the domain of the following real valued functions:

$$(i) f(x) = \frac{1}{\sqrt{x^2 - a^2}} \quad (a > 0)$$

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

$$(iii) f(x) = \sqrt{x^2 - 1} + \frac{1}{\sqrt{(x^2 - 3x + 2)}}$$

$$(iv) f(x) = \frac{1}{\sqrt{|x| + x}}$$

$$(v) f(x) = \frac{1}{\log(2 - x)}$$



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4. Find the domains of the real valued function

$$f(x) = |x - 3|$$



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5. Find the domains for the following real valued functions:

$$(i) f(x) = \sqrt{4x - x^2}$$

$$(ii) f(x) = \sqrt{2 - x} + \sqrt{1 + x}$$

$$(iii) f(x) = \frac{\sqrt{3+x} + \sqrt{3-x}}{x}$$

$$(iv) f(x) = \sqrt{|x| - x},$$

$$(v) f(x) = \sqrt{x - |x|}$$

$$(vi) f(x) = \sqrt{|x| - x}$$



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6. Find the domain of the following real valued functions:

$$(i) f(x) = \frac{1}{\sqrt{x^2 - a^2}} (a > 0)$$

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

$$(iii) f(x) = \sqrt{x^2 - 1} + \frac{1}{\sqrt{(x^2 - 3x + 2)}}$$

$$(iv) f(x) = \frac{1}{\sqrt{|x| + x}}$$

$$(v) f(x) = \frac{1}{\log(2 - x)}$$



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7. Find the domains of the real valued function

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

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8. Find the domain of the following real valued functions:

(i) $f(x) = \sqrt{x^2 - 25}$

(ii) $f(x) = \sqrt{x^2 - 3x + 2}$,

(iii) $f(x) = \frac{\sqrt{2+x} + \sqrt{2-x}}{x}$

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9. Find the domains for the following real valued functions:

(i) $f(x) = \sqrt{4x - x^2}$

(ii) $f(x) = \sqrt{2-x} + \sqrt{1+x}$

(iii) $f(x) = \frac{\sqrt{3+x} + \sqrt{3-x}}{x}$

(iv) $f(x) = \sqrt{|x| - x}$,

$$(v) f(x) = \sqrt{x - |x|}$$

$$(vi) f(x) = \sqrt{|x| - x}$$



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10. Find the domains for the following real valued functions:

$$(i) f(x) = \sqrt{4x - x^2}$$

$$(ii) f(x) = \sqrt{2 - x} + \sqrt{1 + x}$$

$$(iii) f(x) = \frac{\sqrt{3 + x} + \sqrt{3 - x}}{x}$$

$$(iv) f(x) = \sqrt{|x| - x},$$

$$(v) f(x) = \sqrt{x - |x|}$$

$$(vi) f(x) = \sqrt{|x| - x}$$



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11. Find the range of the function $f(x) = \log|4 - x^2|$



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12. Find the ranges of the real valued function

$$\sqrt{[x] - x}$$



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13. Find the ranges of the real valued function

$$\frac{\sin \pi[x]}{1 + [x]^2}$$



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14. Find the range of the function $\frac{x^2 - 4}{x - 2}$



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15. Find the ranges of the real valued function

$$\sqrt{9 - x^2}$$



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16. If f and g are real valued functions define by $f(x) = 2x - 1$ and $g(x) = x^2$ then find (i) $(3f - 2g)(x)$

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17. If f and g are real valued functions define by $f(x) = 2x - 1$ and $g(x) = x^2$ then find (ii) $(fg)(x)$

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18. If f and g are real valued functions define by $f(x) = 2x - 1$ and $g(x) = x^2$ then find (iv) $\left(\frac{\sqrt{f}}{g}\right)(x)$

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19. If f and g are real valued functions defined by $f(x) = 2x - 1$ and $g(x) = x^2$ then find

(ii) $(f+g+2)(x)$.



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20. If $f = \{(1, 2), (2, -3), (3, -1)\}$ then find

(i) $2f$.



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21. If $f = \{(1, 2), (2, -3), (3, -1)\}$ then find (i) $2 + f$



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22. If $f = \{(1, 2), (2, -3), (3, -1)\}$ then find (ii) f^2



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23. If $f = \{(1, 2), (2, -3), (3, -1)\}$ then find \sqrt{f}



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24. Find the domain of the following real valued functions:

(i) $f(x) = \sqrt{x^2 - 25}$

(ii) $f(x) = \sqrt{x^2 - 3x + 2}$,

(iii) $f(x) = \frac{\sqrt{2+x} + \sqrt{2-x}}{x}$



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25. Find the domain of the real function $\log(x^2 - 4x + 3)$



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26. Find the domain of the following real valued functions:

(i) $f(x) = \sqrt{x^2 - 25}$

(ii) $f(x) = \sqrt{x^2 - 3x + 2}$,

(iii) $f(x) = \frac{\sqrt{2+x} + \sqrt{2-x}}{x}$



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27. Find the domains of the real valued function

$$f(x) = \frac{1}{3\sqrt{(x-2)} \log_{(4-x)} 10}$$



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28. Find the domains of the real valued function

$$f(x) = \sqrt{\frac{2-x^2}{[x] + 2}}$$



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29. Find the domain of the real valued function

$$f(x) = \sqrt{\log_{0.3}(x-x)^2}$$



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30. Find the domains of the following real valued functions:

$$(i) f(x) = \frac{2x^2 - 5x + 7}{(x-1)(x-2)(x-3)}$$

$$(ii) f(x) = \frac{1}{(x^2-1)(x+3)}$$

$$(iii) f(x) = \frac{1}{6x - x^2 - 5}$$

$$(iv) f(x) = \frac{1}{x + |x|}$$



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31. P.T the real valued function $f(x) = \frac{x}{e^x - 1} + \frac{x}{2} + 1$ is an even function on $R - \{0\}$.



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32. Find the domain and range of the function

$$f(x) = \frac{\tan \pi[x]}{1 + \sin \pi[x] + [x^2]}$$



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



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34. Find the domain and range of the function $f(x) = |x| + |1 + x|$



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