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India's Number 1 Education App

MATHS

BOOKS - TELUGU ACADEMY MATHS (TELUGU ENGLISH)

FUNCTIONS

Exercise Composite Functions

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

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

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3. If $f: R \to R, g: R \to R$ are defined by $f(x) = 4x - 1, g(x) = x^2 + 2$ then find (i) $(gof)(x)$

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4. If $f: R \to R, g: R \to R$ are defined by $f(x) = 4x - 1, g(x) = x^2 + 2$ then find (ii) $(gof)\left(\frac{a+1}{4}\right)$

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5. If $f: R \to R, g: R \to R$ are defined by $f(x) = 4x - 1, g(x) = x^2 + 2$ then find (iii) $fof(x)$

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6. If $f: R \to R, g: R \to R$ are defined by $f(x) = 4x - 1, g(x) = x^2 + 2$ then find (iv) $go(fof)(x)$

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

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8. If $f: R \to R, g: R \to R$ are defined by $f(x) = 3x - 1$ and $g(x) = x^2 + 1$, then find (ii) $(fof)\left(x^2 + 1\right)$

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9. If $f: R \to R, g: R \to R$ are defined by $f(x) = 3x - 1$ and $g(x) = x^2 + 1$, then find (iii) $(gof)(2a - 3)$

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10. If $f(x) = 2, g(x) = x^2, h(x) = 2x$ then find $(\text{fogoh})(x)$

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11. If $f(x) = \frac{x+1}{x-1}, x \neq 1$ then find $(fofof)(x)$.

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Exercise Functions As Ordered Pairs

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

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

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

find (i) $f + g$

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

find (ii) $f - g$

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

find (iii) fg

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

find (iv) $\sqrt{f}$

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Exercise Spq

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

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

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3. $f: R \to R$ defined by $f(x) = \frac{2x + 1}{3}$, then this function is injection or not? Justify.

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4. Find the inverse of the real function of $f(x) = ax + b, a \neq 0.$

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5. Find the domain of the real function $\frac{\sqrt{3 + x} + \sqrt{3 - x}}{x}$

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Exercise One One Onto Functions

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

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

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3. If Q is the set of all rational numbers, and $f: Q \to Q$ is defined by $f(x) = 5x + 4, \forall x \in Q$, show that f is a bijection.

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Exercise Inverse Of A Function

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

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2. Find the inverse function of $f(x) = \log_2 x$

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3. Find the inverse function of $f(x) = 5^x$.

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Exercise Even Odd Functions

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

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

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Exercise Domains And Ranges

1. Find the domain of the real function $f(x) = \sqrt{16 - x^2}$

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

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3. Find the domain of $\sqrt{x^2 - 3x + 2}$

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4. Find the domain of the real function $f(x) = \sqrt{4x - x^2}$

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

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

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7. Find the domain of $\frac{1}{\sqrt{x^2-a^2}}$

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

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9. Find the domain of the real function $f(x) = \frac{1}{\log(2-x)}$

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10. Find the domain of the real function $\frac{\sqrt{2+x}+\sqrt{2-x}}{x}$

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11. Find the domain of the real function $\frac{2x^2-5x+7}{(x-1)(x-2)(x-3)}$

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

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13. Find the domain of $f(x)=\frac{1}{6x-x^2-5}$

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14. Find the domain of $f(x) = \frac{3^x}{x+1}$

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

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

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17. Find the domain and range of the real valued function $f(x) = \frac{2+x}{2-x}$

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

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

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20. If the function f is defined by

$$f(x) = \begin{cases} x + 2, & x > 1 \\ 2, & -1 \leq x \leq 1 \\ x - 1, & -3g < x < -1 \end{cases}$$

then find the values of (i) $f(3)$

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21. If the function f is defined by

$$f(x) = \begin{cases} x + 2, & x > 1 \\ 2, & -1 \leq x \leq 1 \\ x - 1, & -3g < x < -1 \end{cases}$$

then find the values of (ii) $f(0)$

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22. If the function f is defined by $f(x) = \begin{cases} x+2, & x > 1 \\ 2, & -1 \leq x \leq 1 \\ x-1, & -3 < x < -1 \end{cases}$ then find the values of (iii) $f(-1.5)$

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23. If the function f is defined by $f(x) = \begin{cases} x+2, & x > 1 \\ 2, & -1 \leq x \leq 1 \\ x-1, & -3g < x < -1 \end{cases}$ then find the values of (iv) $f(2) + f(-2)$

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24. If the function f is defined by $f(x) = \begin{cases} x+2, & x > 1 \\ 2, & -1 \leq x \leq 1 \\ x-1, & -3 < x < -1 \end{cases}$ then find the values of (v) $f(-5)$

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25. If the function f is defined by $f(x) = \begin{cases} 3x-2, & x > 3 \\ x^2-2, & -2 \leq x \leq 2 \\ 2x = 1, & x < -3 \end{cases}$

then find the values, if exist, of (i) $f(4)$

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26. If the function f is defined by $f(x) = \begin{cases} 3x-2, & x > 3 \\ x^2-2, & -2 \leq x \leq 2 \\ 2x = 1, & x < -3 \end{cases}$

then find the values, if exist, of (ii) $f(2.5)$

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27. If the function f is defined by $f(x) = \begin{cases} 3x - 2, & x > 3 \\ x^2 - 2, & -2 \leq x \leq 2 \\ 2x = 1, & x < -3 \end{cases}$

then find the values, if exist, of (iii) $f(-2)$

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28. If the function f is defined by $f(x) = \begin{cases} 3x - 2, & x > 3 \\ x^2 - 2, & -2 \leq x \leq 2 \\ 2x = 1, & x < -3 \end{cases}$

then find the values, if exist, of (iv) $f(-4)$

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29. If the function f is defined by $f(x) = \begin{cases} 3x - 2, & x > 3 \\ x^2 - 2, & -2 \leq x \leq 2 \\ 2x = 1, & x < -3 \end{cases}$

then find the values, if exist, of (v) $f(0)$

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30. If the function f is defined by $f(x) = \begin{cases} 3x - 2, & x > 3 \\ x^2 - 2, & -2 \leq x \leq 2 \\ 2x = 1, & x < -3 \end{cases}$

then find the values, if exist, of (vi) $f(-7)$

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31. 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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32. 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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33. If f and g are real valued functions define by $f(x) = 2x - 1$ and $g(x) = x^2$ then find (iii) $(f + g + 2)(x)$

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34. 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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35. If $f(x) = x^2$ and $g(x) = |x|$, then find (i) $f + g$

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36. If $f(x) = x^2$ and $g(x) = |x|$, then find (ii) $f - g$

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37. If $f(x) = x^2$ and $g(x) = |x|$, then find (iii) fg

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

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

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

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Exercise Vsaq

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

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2. If $f: R \to R, g: R \to R$ are defined by $f(x) = 2x^2 + 3$ and $g(x) = 3x - 2$, then find (i) $(\text{fog})(x)$

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

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4. If $f: R \to R, g: R \to R$ are defined by $f(x) = 2x^2 + 3$ and $g(x) = 3x - 2$, then find (iii) $(fof)(0)$

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

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

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

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8. If $f: R - (\pm 1) \to R$ 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 $f: R \to R, g: R \to R$ are defined by $f(x) = 3x - 2, g(x) = x^2 + 1$, then find (i) $\left(gof^{-1}\right)(2)$

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10. If $f: R \to R, g: R \to R$ are defined by $f(x) = 3x - 2, g(x) = x^2 + 1$, then find (ii) $(\text{gof})(x - 1)$

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11. If $f: R \to R, g: R \to R$ are defined by $f(x) = 2x - 3, g(x) = x^3 + 5$ then find $(\text{fog})^{-1}(x)$

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12. If $f(x) = 1 + x + x^2 + \ldots.$ for $|x| < 1$ then show that $f^{-1}(x) = \dfrac{x - 1}{x}$

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13. If $f(x) = \dfrac{x - 1}{x + 1}, x \neq \pm 1$, show that $fof^{-1}(x) = x.$

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

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

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

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17. On what domain the functions $f(x) = x^2 - 2x$ and $g(x) = -x + 6$ are equal?

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18. 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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19. If $f: R \to R$ 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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20. Is $g = \{(1, 1), (2, 3), (3, 5), (4, 7)\}$ is a function from $A = \{1, 2, 34, \}$. 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 $f: \{-1, 1\} \to \{0, 2\}$, defined by $f(x) = ax + b$ is a surjection, then find a & b.

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22. If $f: N \to N$ is defined as $f(x) = 2x + 5$, is f onto?

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23. Determine whether the function $f: R \to (0, \infty)$ defined by $f(x) = 2^x$ is one one (or) onto (or) bijection.

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24. Determine whether the function $f:(o,\infty)\to R$ defined by $f(x)\log_e x$ is one one (or)onto (or)bijection.

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25. Determine whether the function $f:R\to[0,\infty)$ defined by $f(x)=x^2$ is one one (or)onto (or)bijection.

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26. Determine whether the function $f:R\to[0,\infty)$ defined by $f(x)=x^2$ is one one (or)onto (or)bijection.

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27. Determine whether the function $f: R \to (0, \infty)$ defined by $f(x) = 2^x$ is one one (or) onto (or) bijection.

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28. 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) $f: A \to A$

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

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

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

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32. Determine whether the function $f(x) = \sin x + \cos x$ is even or odd.

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33. 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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34. Find the domain of the real valued function $f(x) = \sqrt{(x-\alpha)(\beta - x)}, (\theta < \alpha < \beta)$.

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35. Find the domian of the real valued function $f(x) = \sqrt{\log_{0.3}(x-x)^2}$

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36. Find the domain of $f(x) = \sqrt{x - [x]}$

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37. Find the domain of $f(x) = \sqrt{[x] - x}$

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38. Find the domain of $f(x) = \sqrt{[x] - x}$

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39. Find the domain of $f(x) = \log(x - |x|)$.

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40. Find the domain of $f(x) = \frac{1}{(\sqrt[3]{x-2}(\log_{4-x} 10))}$.

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

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Exercise Miscellaneous

1. Define a One-one function. Give an example.

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2. Define a Onto function. Give an example.

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3. Define a Bijective function. Give an exmple.

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4. Define an Even funtion and an Odd function. Give an example to each.

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5. Define an Identity function.

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6. Define a Constant Function.

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7. Define an Polynomial function.

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8. Define an Algebraic function.

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9. Define a Rational function. Give an example.

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10. Define Modulus function. What is its domain and range?

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11. Define Greatest integer function. What is its domain and range?

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12. Define Signum function. What is its domain and range?

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

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

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15. Find the domain of $f(x) = \sqrt{\log_{10}\left(\frac{3-x}{x}\right)}$

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16. Find the domain of the real function $f(x) = \frac{1}{\sqrt{[x]^2 - [x] - 2}}$.

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17. Find the domain of $f(x) = |x - 3|$.

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18. Find the domain of $f(x) = \sqrt{\frac{4 - x^2}{[x] + 2}}$

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19. Find the domain of $f(x) = \dfrac{1}{x + |x|}$.

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20. Find the range of $\log|4 - x^2|$

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21. Find the range of $\dfrac{\sin \pi[x]}{1 + [x]^2}$.

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22. Find the range of $\sqrt{9 + x^2}$.

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23. Find the domain and range of $f(x) = \frac{\tan \pi[x]}{1 + \sin x[x] + [x^2]}$.

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24. If the function $f: R \to R$ 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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25. If the function $f: R \to R$ 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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26. If $f(x) = \cos(\log x)$, then show that $f\left(\frac{1}{x}\right).f\left(\frac{1}{y}\right) - \frac{1}{2}\left[f\left(\frac{x}{y}\right) + f(xy)\right] = 0$

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27. If $A = \{1, 2, 3\}, B = (\alpha, \beta, \gamma), c = (p, q, r)$ and $(f: A \to B, g: B \to C$ 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 $(gof)^{-1} = f^{-1}og^{-1}$.

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