

India's Number 1 Education App

### **MATHS**

### **BOOKS - TELUGU ACADEMY MATHS (TELUGU ENGLISH)**

### **FUNCTIONS**

#### **Exercise Composite Functions**

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



- **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  $f\!:\!R o R, g\!:\!R o R$  are defined by  $f(x)=4x-1, g(x)=x^2+2$  then find (i) (gof)(x)



**4.** If  $f\!:\!R o R,g\!:\!R o R$  are defined by  $f(x)=4x-1,g(x)=x^2+2$  then find (ii)  $(gof)\Big(rac{a+1}{4}\Big)$ 



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



**6.** If  $f: R \to R, g: R \to R$  are defined

by

by

f(x) = 4x - 1,  $g(x) = x^2 + 2$  then find (iv) go(fof)(x)

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



**8.** If  $f: R \to R, g: R \to R$  are defined  $f(x)=3x-1 \,\, {
m and} \,\, g(x)=x^2+1$  , then find (ii)  $(fof)ig(x^2+1ig)$ 



If  $f\!:\!R o R,\,g\!:\!R o R$  are defined

by

 $f(x)=3x-1 \,\, {
m and} \,\, g(x)=x^2+1$  , then find (iii) (gof)(2a-3)



9.

**10.** If f(x) = 2,  $g(x) = x^2$ , h(x) = 2x then find (fogoh)(x)



**11.** If 
$$f(x)=rac{x+1}{x-1}, x
eq 1$$
 then find  $(fofof)(x)$ .



### **Exercise Functions As Ordered Pairs**

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

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

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

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



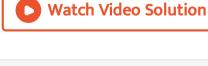
find (i) 
$$f + g$$

find (ii) 
$$f-g$$



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

find (iii) fq



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

find (iv)  $\sqrt{f}$ 



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

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



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



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



- **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  $f\!:\!Q o Q$  is defined by  $f(x)=5x+4,\ orall x\in Q,$  show that f is a bijection.
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### **Exercise Inverse Of A Function**

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



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



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



**Exercise Even Odd Functions** 

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



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



## **Exercise Domains And Ranges**

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



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



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

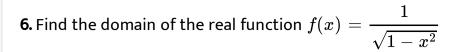


**4.** Find the domain of the real function  $f(x) = \sqrt{4x - x^2}$ 



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







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



- **8.** Find the domain of the real function  $\log (x^2 4x + 3)$ 
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- **9.** Find the domain of the real function  $f(x) = \dfrac{1}{\log(2-x)}$ 
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**10.** Find the domain of the real function 
$$\frac{\sqrt{2+x}+\sqrt{2-x}}{x}$$



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



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





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

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



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



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



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



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

**21.** If the function 
$$f$$
 is defined by  $f(x)=egin{cases} x+2,&x>1\ 2,&-1\leq x\leq 1\ x-1,&-3g< x<-1 \end{cases}$  then find the values of (ii)  $f(0)$ 

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

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

**22.** If the function 
$$f$$
 is defined by  $\int x+2, \ x>1$ 

$$f(x)= egin{cases} x+2,&x>1\ 2,&-1\leq x\leq 1\ x-1,&-3< x<-1 \end{cases}$$
 then find the values of (iii)

**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) 
$$f(2)+f(-2)$$



**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)

**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)  $f(4)$ 



**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)  $f(2.5)$ 



**27.** If the function f is defined by  $f(x)= \left\{ egin{array}{ll} 3x-2,& x>3 \ x^2-2,& -2\leq x\leq 2 \ 2x=1,& x<-3 \end{array} 
ight.$ 

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



**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)



**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)



**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)



**31.** If f and g are real valued functions define by  $f(x)=2x-1 \ {
m and} \ g(x)=x^2$  then find (i) (3f-2g)(x)



**32.** If f and g are real valued functions define by  $f(x)=2x-1 \,\, {
m and} \,\, g(x)=x^2$  then find (ii) (fg)(x)



**33.** If f and g are real valued functions define by 
$$f(x)=2x-1 \,\, {
m and} \,\, g(x)=x^2$$
 then find (iii)  $(f+g+2)(x)$ 



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



**35.** If 
$$f(x)=x^2 \,\, ext{and} \,\, g(x)=|x|$$
 , then find (i)  $f+g$ 



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**37.** If 
$$f(x)=x^2 \, ext{ and } \, g(x)=|x|$$
 , then find (iii)  $fg$ 



### **38.** If $f(x)=x^2 \,\, ext{and} \,\, g(x)=|x|$ , then find (iv) 2f



### **39.** If $f(x)=x^2 \,\, ext{and} \,\, g(x)=|x|$ , then find (v) $f^2$



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



(fog)(y) = y

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

- **2.** If  $f\!:\!R o R,g\!:\!R o R$  are defined by  $f(x)=2x^2+3$  and g(x)=3x-2, then find (i)  $(\log)(x)$ 
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- **3.** If  $f\!:\!R o R,\,g\!:\!R o R$  are defined by  $f(x)=2x^2+3$  and g(x)=3x-2, then find (ii) (gof)(x)
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**4.** If  $f\!:\!R o R,\,g\!:\!R o R$  are defined by

$$f(x)=2x^2+3 \,\, {
m and} \,\, g(x)=3x-2, \,\, {
m then \,\, find \,\, (iii)} \,\, (fof)(0)$$



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



**6.**  $f\!:\!R-\{0\} o R$  is defined as  $f(x)=x+rac{1}{x}$  then show that  $(f(x))^2=fig(x^2ig)+f(1)$ 



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



**8.** If 
$$f\!:\!R-(\,\pm\,1) o R$$
 is defined by  $f(x)=\log\Bigl|rac{1+x}{1-x}\Bigr|$ , then show that  $f\Bigl(rac{2x}{1+x^2}\Bigr)=2f(x).$ 



9. If 
$$f\!:\!R o R,g\!:\!R o R$$
 are defined  $f(x)=3x-2,g(x)=x^2+1,$  then find (i)  $ig(gof^{-1}ig)(2)$ 

by



**10.** If 
$$f\!:\!R o R,\,g\!:\!R o R$$
 are defined

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

by



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

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



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

**13.** If 
$$f(x)=rac{x-1}{x+1}, x
eq \pm 1, ext{ show that } fof^{-1}(x)=x.$$

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



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



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



**17.** On what domain the functions

$$f(x)=x^2-2x \ \ {
m and} \ \ g(x)=\ -x+6$$
 are equal?



**18.** If 
$$f(x)=rac{\cos^2x+\sin^4x}{\sin^2x+\cos^4x}$$
  $orall x\in R$  then show that  $f(2012)=1$ .

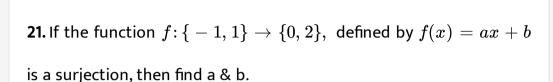


- **19.** If  $f\!:\!R o R$  is defined by  $f(x)=rac{1-x^2}{1+x^2}$  then show that  $f( an heta)=\cos 2 heta.$ 
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**20.** Is  $g=\{(1,1),(2,3),(3,5),(4,7)\}$  is a function from  $A=\{1,2,34,\}$ . to  $B=\{1,3,5,7\}$ ? If this is given by the formula

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g(x) = ax + b, then find a and b.



**23.** Determine whether the function  $f: R \to (0, \infty)$  defined by

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





 $f(x)=2^x$  is one one (or) onto (or) bijection.

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



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



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



**27.** Determine whether the function  $f\!:\!R o(0,\infty)$  defined by  $f(x)=2^x$ 

is one one (or) onto (or) bijection.



**28.** If  $A=\{x\colon -1\le x\le 1\},$   $f(x)=x^2 \ ext{and} \ g(x)=x^3,$  which of the following functions are onto? (i)  $f\colon A\to A$ 



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



**30.** Let  $A=\{1,2,3\}, B=\{a,b,c\}, C=\{p,q,r\}.$  If

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



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



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



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



**34.** Find the domain of the real valued function  $f(x)=\sqrt{(x-lpha)(eta-x)},$  ( heta<lpha<eta).



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



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



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



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

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

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



### **Exercise Miscellaneous**

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



2. Define a Onto function. Give an example.



**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.  Watch Video Solution
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<b>9.</b> 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?



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



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



**15.** Find the domain of 
$$f(x) = \sqrt{\log_{10}\!\left(rac{3-x}{x}
ight)}$$



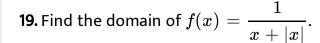
**16.** Find the domain of the real function  $f(x) = \dfrac{1}{\sqrt{\left[x\right]^2 - \left[x\right] - 2}}.$ 



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



- **18.** Find the domain of  $f(x) = \sqrt{\frac{4-x^2}{[x]+2}}$ 
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## **20.** Find the range of $\log \lvert 4 - x^2 vert$



# **21.** Find the range of $\frac{\sin \pi[x]}{1+\left[x ight]^2}$ .



- **22.** Find the range of  $\sqrt{9+x^2}$ .
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**23.** Find the domain and range of  $f(x) = rac{ an \pi[x]}{1 + \sin x[x] + [x^2]}.$ 



**24.** If the function  $f\colon R o R$  defined by  $f(x)=rac{3^x+3^{-x}}{2}$ , then S.T f(x+y)+f(x-y)=2f(x)f(y).



**25.** If the function  $f\colon R\to R$  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  $f\Big(\frac14\Big)+2f\Big(\frac12\Big)+f\Big(\frac34\Big).$ 



**26.** If 
$$f(x)=\cos(\log x)$$
, then show  $f\Big(\frac{1}{x}\Big).\ f\Big(\frac{1}{y}\Big)-\frac{1}{2}\bigg[f\Big(\frac{x}{y}\Big)+f(xy)\bigg]=0$ 



**27.** If 
$$A=\{1,2,3\}, B=(lpha,eta,\gamma), c=(p,q,r) ext{ and } (f{:}A o B,g{:}B o C$$

defined by  $f=\{(1,\alpha),(2,\gamma),(3,\beta)\},g=\{(\alpha,q),(\gamma,p)\}$ 

that

then show that f and g are bijective functions and  $\left(gof\right)^{-1}=f^{-1}og^{-1}.$