#### MathonGo

Let 
$$f: \mathbf{R} \to \mathbf{R}$$
 and  $g: \mathbf{R} \to \mathbf{R}$  be defined as nongo /// mathongo /// mathongo

$$f(x) = \begin{cases} \log_e x & , & x > 0 \\ \ln e^{-x} & , & x \leq 0 \end{cases}$$
 and  $mathongo$  /// mathongo /// mathongo /// mathongo

$$g(x) = \begin{cases} x & \text{if } x \geq 0 \\ t_{e^{x}} \log 0 & \text{if } x \leq 0 \end{cases}$$
Then, gof:  $\mathbf{R} \to \mathbf{R}$  is:  $g(x) = \mathbf{R} \to \mathbf{R}$  is:  $g(x)$ 

### Q2 - 2024 (01 Feb Shift 2)

If the domain of the function 
$$f(x)=rac{\sqrt{x^2-25}}{(4-x^2)}+\log_{10}ig(x^2+2x-15ig)$$
 is  $(-\infty,\alpha)U[eta,\infty)$ , then  $lpha^2+eta^3$  is

The function 
$$f: N - \{1\} \rightarrow N$$
; defined by  $f(n) =$  the highest prime factor of  $n$ , is:

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MathonGo

Let  $\mathrm{f}:\mathrm{R}-\left\{rac{-1}{2}
ight\} o\mathrm{R}$  and  $\mathrm{g}:\mathrm{R}-\left\{rac{-5}{2}
ight\} o\mathrm{R}$  be defined as  $f(x)=rac{2x+3}{2x+1}$  and  $g(x)=rac{|x|+1}{2x+5}$ . Then the

domain of the function fog is: \_\_\_\_\_ mathongo \_\_\_\_ mathongo \_\_\_\_ mathongo \_\_\_\_ mathongo

(1) 
$$R - \left\{-\frac{5}{2}\right\}$$
 /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo

(3) 
$$\operatorname{Res}\left\{ \pm \frac{7}{4} \right\}$$
 //// mathongo //// mathongo ///// mathongo ///// mathongo

(4) 
$$R - \left\{-\frac{5}{2}, -\frac{7}{4}\right\}$$
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Q5 - 2024 (29 Jan Shift 1) mathongo ///. mathongo ///. mathongo ///. mathongo

$$\text{If } f(x) = \begin{cases} 2+2x, -1 \leq x < 0 \\ 1-\frac{x}{3}, 0 \leq x \leq 3 \end{cases}; g(x) = \begin{cases} -x, -3 \leq x \leq 0 \\ x, 0 < x \leq 1 \end{cases}$$
 mathongo

then range of (fog(x)) is nathongo /// mathongo /// mathongo /// mathongo

(1) (0, 1]

mathongo /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo (2)[0,3)

(3) [0,1]thongo /// mathongo /// mathongo /// mathongo /// mathongo

(4) [0, 1)//. mathongo //. mathongo //. mathongo //. mathongo //. mathongo

Q6 - 2024 (29 Jan Shift 1) mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo

Consider the function  $f: \left[\frac{1}{2}, 1\right] \to R$  defined by  $f(x) = 4\sqrt{2}x^3 - 3\sqrt{2}x - 1$ . Consider the statements

(I) The curve y = f(x) intersects the x-axis exactly at one point

(II) The curve y = f(x) intersects the x-axis at  $x = \cos \frac{\pi}{12}$  mathongo /// mathongo ///

Then mathongo /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo

(1) Only (II) is correct

(2) Both (I) and (II) are incorrect

(3) Only (I) is correct mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo

(4) Both (I) and (II) are correct ///. mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo

Q7 - 2024 (29 Jan Shift 1) nathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo

#### MathonGo

Let  $f(x) = 2^x - x^2$ ,  $x \in R$ . If m and n are respectively the number of points at which the curves y = f(x) and y = f'(x) intersects the x-axis, then the value of m + n is

Q8 - 2024 (30 Jan Shift 1) mathongo ///. mathongo ///. mathongo ///. mathongo

If the domain of the function  $f(x) = \cos^{-1}\left(\frac{2-|x|}{4}\right) + (\log_e(3-x))^{-1}$  is  $[-\alpha,\beta) - \{y\}$ , then  $\alpha+\beta+\gamma$  is equal to :

- ///. mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo
- (1) 12
- (2) 9mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo
- (3) 11
  /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo
- Q9 2024 (30 Jan Shift 1)

  /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo

Let  $A = \{1, 2, 3, \dots 7\}$  and let P(1) denote the power set of A. If the number of functions  $f: A \to P(A)$  such that  $a \in f(a), \forall a \in A \text{ is } m^n, m \text{ and } n \in N \text{ and } m \text{ is least, then } m+n \text{ is equal to } \underbrace{}^{\text{constant}}$ 

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#### Q10 - 2024 (30 Jan Shift 2)

If the domain of the function  $f(x) = \log_e\left(\frac{2x+3}{4x^2+x-3}\right) + \cos^{-1}\left(\frac{2x-1}{x+2}\right)$  is  $(\alpha,\beta]$ , then the value of  $5\beta - 4\alpha$  is

equal to thongo /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo

- (1) 10 // mathongo // mathongo // mathongo // mathongo // mathongo // mathongo // mathongo
- (3) 11nathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo
- (4) 9 /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo

Q11 - 2024 (30 Jan Shift 2) athongo ///. mathongo ///. mathongo ///. mathongo

Let f:R o R be a function defined  $f(x)=rac{x}{(1+x^4)^{1/4}}$  and g(x)=f(f(f(f(x)))) then  $18\int_0^{\sqrt{2\sqrt{5}}}x^2g(x)dx$ 

- mathongo // mathon

MathonGo

$$\binom{3}{4}$$
 42 athongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo

If 
$$f(x)=rac{4x+3}{6x-4}, x
eq rac{2}{3}$$
 and  $(f\circ f)(x)=g(x)$ , where  $g:\mathbb{R}-\left\{rac{2}{3}
ight\}
ightarrow\mathbb{R}-\left\{rac{2}{3}
ight\}$ , then (gogog) (4) is equal to

$$(1)$$
  $-\frac{19}{20}$  /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo

If the function  $f:(-\infty,-1] o (a,b]$  defined by  $f(x)=e^{x^3-3x+1}$  is one-one and onto, then the distance of the point  $P(2 \ \mathrm{b} + \overline{4}, \mathrm{a} + 2)$  from the line  $x + e^{-3}y = 4$  is :

(2) 
$$4\sqrt{1+e^6}$$
 go ///. mathongo ///. mathongo ///. mathongo ///. mathongo

(3) 
$$3\sqrt{1+e^6}$$

Questions with Ans	_				MathonGo
Answer Ke	y///. mathongo				
Q1 (2) athongo	///. matQ2 (3)		Q3 (4) athongo	///. maQ4(1)	
Q5 (3) athongo	///. matQ6 (4)		Q7 (5) athongo	/// maQ8(3)	
Q9 (44) ithongo	///. matQ10 (2	) ///. mathongo	Q11 (4)athongo	///. maQ12 (4)	
Q13 (1) thongo					
/// mathongo	/// mathoned ou want to practic	mathongo ce these PYQs along	mathones with PYQs of JEE N	// mathonico Main from 2002 till 2	/// mathongo 2024?

**Solutions** MathonGo ///. mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo mathongo /// mathongo mathongo /// mathongo athongo ///. mathongo ///. mathongo thonso ///. mathongo ///. mathongo ///. mathongo ///. mathongo  $g(\mathbf{f}(\mathbf{x})) = \begin{cases} f(x), f(x) \geq 0 ext{ ongo} \end{cases}$  mathon  $g(\mathbf{x}) = \begin{cases} f(x), f(x) \geq 0 ext{ ongo} \end{cases}$  mathon  $g(\mathbf{x}) = \begin{cases} f(x), f(x) \geq 0 ext{ ongo} \end{cases}$ ///. matho $(\ln x, [1, \infty))$  athongo ///. mathongo ///. mathongo ///. mathongo  $\frac{mathonics}{Graph of g(f(x))}$   $\frac{mathonics}{g(f(x))}$  mathonics  $\frac{mathonics}{g(f(x))}$  mathonics  $\frac{mathonics}{g(f(x))}$  mathonics  $\frac{mathonics}{g(f(x))}$  $g(f(x)) \Rightarrow Many \text{ one into}_{athongo}$  /// mathongo /// mathongo /// mathongo Q2 mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo  $f(\mathbf{x}) = \frac{\sqrt{\mathbf{x}^2 - 25}}{\sqrt{\mathbf{x}^2 - 25}} + \log_{10}(\mathbf{x}^2 + 2\mathbf{x} - 15)_{\text{hathongo}}$  /// mathongo /// mathongo Domain :  $x^2 - 25 \ge 0 \Rightarrow x \in (-\infty, -5] \cup [5, \infty)$  $4-x^2 \neq 0 \Rightarrow x \neq \{-2,2\}$  hongo /// mathongo /// mathongo /// mathongo  $x^2 + 2x - 15 > 0 \Rightarrow (x+5)(x-3) > 0$  $(3,\infty)$  ongo  $(3,\infty)$  mathongo  $(3,\infty)$  mathongo  $(3,\infty)$  mathongo  $(3,\infty)$  mathongo  $(3,\infty)$  $\therefore x \in (-\infty, -5) \cup [5, \infty)$  $\alpha=\pm5; \beta=5$  /// mathongo /// mathongo /// mathongo /// mathongo  $\therefore \alpha^2 + \beta^3 = 150$ Q3  $f': N^{n} = 1 - N$  mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo f(n) = The highest prime factor of n.  $f(2)\cong 2$ hongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo f(4) = 2#many one go ///. mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo 4 is not image of any element mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo  $\Rightarrow$  into Do you want to practice these PYQs along with PYQs of JEE Main from 2002 till 2024?

Hence many one and into athongo /// mathongo /// mathongo /// mathongo /// mathongo

Neither one-one nor onto.

Mathongo // mathongo // mathongo // mathongo // mathongo // mathongo // mathongo //

Q4 mathongo /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo

 $f(x) = \frac{2x+3}{2x+1}; x \neq -\frac{1}{2}$  mathongo /// mathongo /// mathongo /// mathongo

 $g(x) = \frac{|x|+1}{2x+5}, x \neq -\frac{5}{2}$  mathongo /// mathongo /// mathongo /// mathongo

Domain of f(q(x))

 $f(g(x)) \triangleq rac{2g(x)+3}{2g(x)+1}$  mathongo ///. mathongo ///. mathongo ///. mathongo

 $x 
eq -\frac{5}{2}$  and  $\frac{|x|+1}{2x+5} 
eq -\frac{1}{2}$  and  $x \in R - \left\{-\frac{5}{2}\right\}$  and  $x \in R$ 

... Domain will be  $R' = \left\{ \frac{5}{2} \right\}$  ngo /// mathongo /// mathongo /// mathongo

mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo

 $f(g(x)) = \begin{cases} 1 - \frac{g(x)}{g(x)} \\ \frac{g(x)}{g(x)} \end{cases}$  mathong /// mathong /// mathong /// mathong /// mathong

By (1)  $x \in \phi$ 

/// mathongo /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo

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And by (2)  $x \in [-3,0]$  and  $x \in [0,1]$  /// mathongo /// mathongo /// mathongo

/// mathon1 /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo

y=f(g(x))/// mathongo /// mathongo /// mathongo /// mathongo

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**Solutions** MathonGo Range of f(g(x)) is [0, 1] mathongo /// mathongo /// mathongo /// mathongo /// mathongo Q6 mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo  $f'(x) = 12\sqrt{2}x^2 - 3\sqrt{2} \ge 0 ext{ for } \left\lfloor \frac{1}{2}, 1 \right\rfloor$  mathongo /// mathongo /// mathongo /// mathongo  $f(1) > 0 \Rightarrow (A)$  is correct. Though /// mathongo /// mathongo /// mathongo /// mathongo  $f(x) = \sqrt{2} \left(4x^3 - 3x\right) - 1 = 0$  mathongo /// mathongo /// mathongo /// mathongo Let  $\cos \alpha = x$ ,  $\cos 3lpha = \cos rac{\pi}{4} \Rightarrow lpha = rac{\pi}{12}$  thongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo  $x = \cos \frac{\pi}{12}$  mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo (4) is correct. **Q**7 ///. mathongo ///. mathongo ///. mathongo athongo matho2go 4% mathongo 2% mathongo 2% mathongo 2% mathongo  $mathongo \alpha$ ///. mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo athongo ///. mathongo ///. mathongo ///. mathongo ///. matho 🖊 mathongo 📈 mathong 1 mathongo ///. mathongo ///. mathongo y=2x//. mathongo ///. mathongo ///. mathongo ///. mathongo ... m=13nongo ///. mathongo  $f'(x) = 2^x \ln 2 - 2x = 0$  $2^x \ln 2 = 2x$  go /// mathongo /// mathongo /// mathongo /// mathongo

$$1 \le \left| \frac{2 - |x|}{1 - 4} \right| \le 1$$
 mathongo ///. mathongo ///. mathongo ///. mathongo

$$-4 \leq 2 - |x| \leq 4$$
 ///  $6 \leq 1 \leq 2$  /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo

$$\Rightarrow x \in [-6,6] \dots (1)$$
 /// mathongo // mathongo /

And 
$$x \neq 2$$
...(2) /// mathongo /// mathongo /// mathongo /// mathongo

and 
$$3-x>0$$
 /// mathongo // matho

$$\alpha=6$$
athongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo

$$eta=3$$
 mathongo /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo ///

$$\gamma=2$$
 mathongo /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo

$$a\in f(a)$$

That means 'a' will connect with subset which contain element 'a'

Ans. 
$$2+42=44$$
 /// mathongo /// mathongo /// mathongo /// mathongo

$$_{
m Q''0}^{\prime\prime\prime}$$
 mathongo  $^{\prime\prime\prime}$  mathongo  $^{\prime\prime\prime}$  mathongo  $^{\prime\prime\prime}$  mathongo  $^{\prime\prime\prime}$  mathongo  $^{\prime\prime\prime}$  mathongo

$$\frac{2x+3}{4x^2+x-3}>0$$
 and  $-1\leq \frac{2x-1}{x+2}\leq 1$  athongo /// mathongo /// mathongo

$$\frac{2 \times +3}{(4x-3)(x+1)} > 0 \quad \frac{3x+1}{x+2} \ge 0 & \frac{x-3}{x+2} \le 0$$
(4x - 3)(x + 1) mathongo mathongo mathongo mathongo

$$(-\infty/2+-1)$$
 $(-\infty/2+-1)$ 
 $(-\infty/$ 

$$\left[\left(\frac{3}{4}, 13\right]\right]$$
 thongo  $\left[\frac{3}{4}, 13\right]$  thongo  $\left[\frac{3}{4}, 13\right]$ 

$$\alpha=\frac{3}{4}\beta=3$$
go /// mathongo /// mathongo /// mathongo /// mathongo

$$5eta-4lpha=15-3=12$$

Q11 /// mathon
$$x^0$$
 /// mathongo /// mathon

$$(1+x^4)^{1/4}$$
 mathong  $\frac{x}{(1+x^4)^{1/4}}$  mathong  $\frac{x}{(1+x^4)^{1/4}}$ 

$$f(f(f(f(x)))) = rac{x}{(1+4x^4)^{1/4}}$$
 mathongo /// mathongo /// mathongo /// mathongo

$$18\int_0^{\sqrt{2\sqrt{5}}} \frac{x^3}{\left(1+4x^4\right)^{1/4}} dx$$
 nongo /// mathongo /// mathongo /// mathongo

Let 
$$1+4x^4=t^4$$
 mathongo /// mathongo /// mathongo /// mathongo /// mathongo

$$\frac{18}{4} \int_{t}^{3} \frac{t^{3}dt}{t} dt = \frac{18}{t} \int_{t}^{3} \frac{t^{3}dt}{$$

$$\frac{20}{4} \int_{1}^{40} \frac{\text{t}}{\text{t}}$$
 mathongo //. mathongo //. mathongo //. mathongo //.

$$\frac{9}{2}\left(\frac{t_{\rm h}^3}{3}\right)_1^3$$
 mathongo /// mathongo /// mathongo /// mathongo

$$=\frac{3}{2}[26]=39$$
 /// mathongo /// mathongo /// mathongo /// mathongo

$$f(x) = \frac{4x+3}{6x-4}$$
 /// mathongo /// mathongo /// mathongo /// mathongo

$$g(x) = \frac{4\left(\frac{4x+3}{6x-4}\right) + 3}{6\left(\frac{4x+3}{6x-4}\right) - 4} = \frac{34x}{34} = x$$

$$\frac{6\left(\frac{4x+3}{6x-4}\right) - 4}{6\left(\frac{4x+3}{6x-4}\right) - 4} = x$$

$$g(x) = x : g(g(g(4))) = 4$$
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Q13

$$f(x) = e^{x^3 - 3x + 1}$$
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$$f'(x)=e^{x^3-3x+1}\cdot (3x^2-3)$$
 $=e^{x^3-3x+1}\cdot 3(x-1)(x+1)$ 
 $=e^{x^3-3x+1}\cdot 3(x-1)(x+1)$  mathongo  $=e^{x^3-3x+1}$  mathongo  $=e^{x^3-3x+1}$  mathongo  $=e^{x^3-3x+1}$ 

For 
$$f'(x) \ge 0$$
 /// mathongo // mathongo //

 $\therefore$  f(x) is increasing function

$$\therefore a = e^{-\infty} = 0 = f(-\infty)$$
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$$P(2b+4,a+2)$$
 /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo

$$\frac{77}{x}$$
 mathogo  $\frac{7}{x}$  mathongo  $\frac{7}{x}$  mathongo  $\frac{7}{x}$  mathongo  $\frac{7}{x}$  mathongo  $\frac{7}{x}$  mathongo

$$m d = rac{(2e^3+4)+2e^{-3}-4}{\sqrt{1+e^{-6}}} = 2\sqrt{1+e^6}$$
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