Questions with Answer Keys

MathonGo

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Q1. If $x=\frac{1-t^2}{1+t^2}$ and $y=\frac{2t}{1+t^2}$, then $\frac{dy}{dx}$ is equal to

 $\frac{\mathbf{A}}{\mathbf{x}}$ wathongo $\frac{y}{\mathbf{x}}$ mathongo $\frac{y}{\mathbf{x}}$ mathongo $\frac{y}{\mathbf{x}}$ mathongo $\frac{y}{\mathbf{x}}$ mathongo $\frac{y}{\mathbf{x}}$ mathongo $\frac{y}{\mathbf{x}}$

B. $\frac{y}{x}$ C. $-\frac{x}{y}$ mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo ///.

 $\frac{\mathbf{p}_{\cdot}}{\mathbf{y}}$ mathongo $\frac{\mathbf{y}_{\cdot}}{\mathbf{y}}$ mathongo $\frac{\mathbf{y}_{\cdot}}{\mathbf{y}}$ mathongo $\frac{\mathbf{y}_{\cdot}}{\mathbf{y}}$ mathongo $\frac{\mathbf{y}_{\cdot}}{\mathbf{y}}$ mathongo $\frac{\mathbf{y}_{\cdot}}{\mathbf{y}}$ mathongo $\frac{\mathbf{y}_{\cdot}}{\mathbf{y}}$ mathongo $\frac{\mathbf{y}_{\cdot}}{\mathbf{y}}$

Ans: $-\frac{x}{y}$ "Mathongo III mathongo II m

Put $t = \tan \theta$ in both the equations, θ mathong θ mathon θ ma

we get $x=rac{1- an^2 heta}{1+ an^2 heta}=\cos2 heta$ and $y=rac{2 an heta}{1+ an^2 heta}=\sin2 heta...(ii)$ mathongo /// mathongo /// mathongo ///

On differentiating both the eqs.(i) and (ii), we get $\frac{dx}{d\theta} = -2\sin 2\theta$ and $\frac{dy}{d\theta} = 2\cos 2\theta$ mathongo ///

Therefore, $\frac{dy}{dx} = \frac{\frac{dy}{d\theta}}{\frac{dx}{d\theta}} = -\frac{\cos 2\theta}{\sin 2\theta} = -\frac{x}{y}$ mathongo /// mathongo /// mathongo ///

Q2. If $\log_{10}\left(\frac{x^3-y^3}{x^3+y^3}\right)=2$, then $\frac{dy}{dx}=$ mathongo /// mathongo /// mathongo ///

///. mathongo ///.

 $\mathbf{B}' - \frac{y}{x}$ athongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo

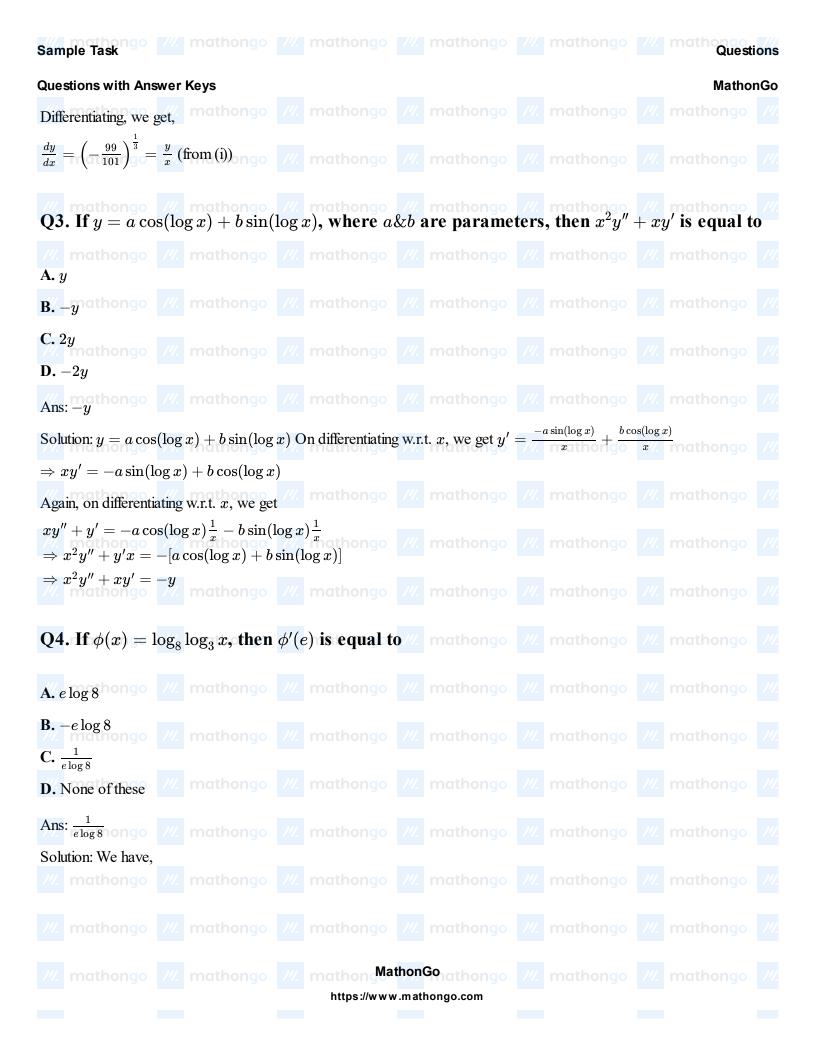
C. $-\frac{x}{y}$ mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo ///.

 $\frac{y}{x}$ athongo /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo ///

Applying componendo and dividendo, we get, $\frac{x^3}{y^3} = -\frac{101}{99} \Rightarrow \frac{x}{y} = \left(-\frac{101}{99}\right)^{\frac{1}{3}} \dots$ (i)

Hence, $y = \left(-\frac{99}{101}\right)^{\frac{1}{3}}x$ mathongo ///. mathongo ///. mathongo ///. mathongo ///.

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Q7. If $y=2+\sqrt{\sin x+2+\sqrt{\sin x+2+\sqrt{\sin x+\dots\infty}}}$, then the value of $\frac{dy}{dx}$ at x=0 is

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B. 2 mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo

C. $\frac{1}{2}$ mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo

 $\frac{1}{3}$ athongo /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo ///

Solution: Given equation can be rewritten as mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo

 $y = 2 + \sqrt{\sin x + y}$ $\Rightarrow (y-2)^2 = \sin x + y$ mathongo /// mathongo /// mathongo /// mathongo /// $\Rightarrow y^2 - 4y + 4 = \sin x + y \dots (i)$

Putting x = 0 in the equation (i), we get, mathongo mathongo mathongo mathongo $y^2 - 4y + 4 = 0 + y \Rightarrow y^2 - 5y + 4 = 0$

 \Rightarrow $(y_{\text{nat}}, (y_{\text{nat}}, y_{\text{nat}}, y_{\text{nat}}, y_{\text{nat}}, y_{\text{nat}}, y_{\text{nat}})$ mathongo /// mathongo /// mathongo ///

y = 1 or y = 4

 $y > 2 \Rightarrow y = 4$ Mow differentiating equation (i) with respect to x, we get, $\frac{dy}{dx} = \frac{\cos x}{2y-5}$

Putting $x \not\equiv 0, y = 4$ /// mathongo //// mathongo //// mathongo //// mathongo

 $\frac{dy}{dx} = \frac{\cos(0)}{2(4)-5} = \frac{1}{3}$ mathongo /// mathongo /// mathongo /// mathongo /// mathongo ///

Q8. If $x=3\cos t$ and $y=5\sin t$, where t is a parameter, then $9\frac{d^2y}{dx^2}$ at $t=-\frac{\pi}{6}$ is equal to

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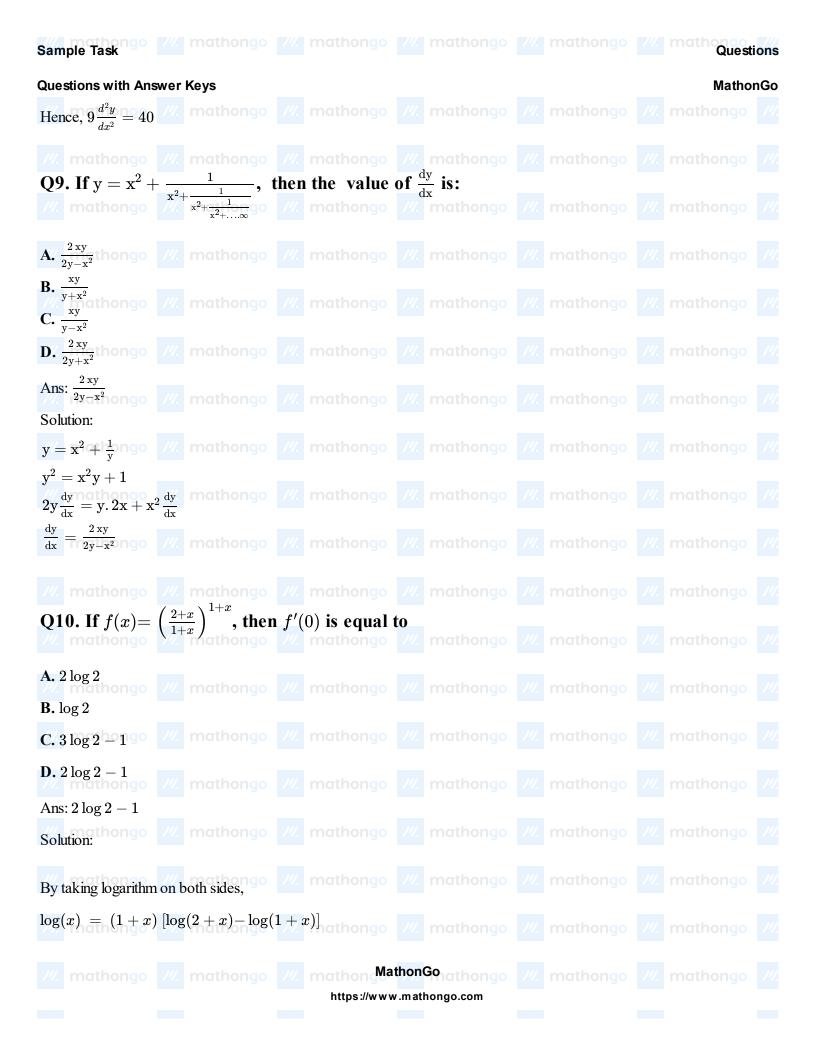
Solution: mathongo /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo ///

 $\frac{dy}{dx} = \frac{\frac{3}{dt}}{\frac{dx}{2}} = \frac{5\cos t}{-3\sin t} = \frac{-5}{3}\cot(t)$ ngo /// mathongo /// mathongo /// mathongo

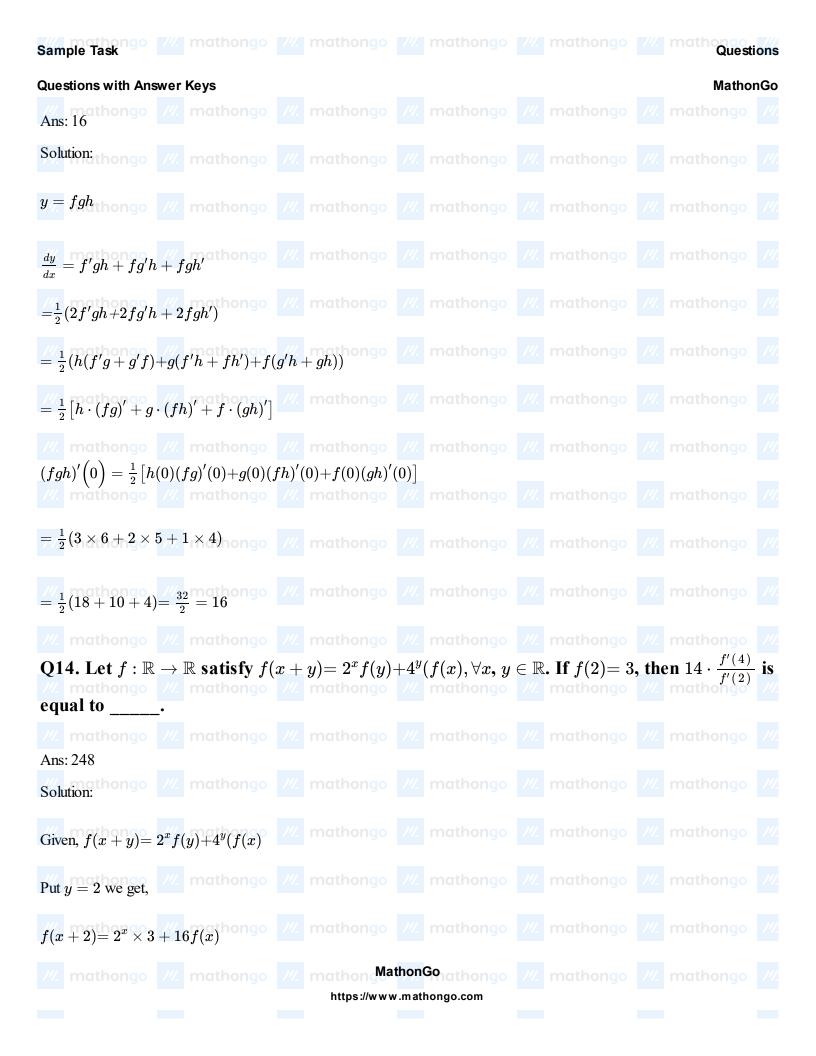
 $\frac{d^2y}{dx^2} = \frac{-5}{3} \cdot \left(-\csc^2 t\right) \cdot \frac{dt}{dx} = \frac{5}{3} \left(\frac{1}{\sin^2 t}\right) \left(\frac{1}{-3\sin t}\right)$ mathongo /// mathongo /// mathongo ///

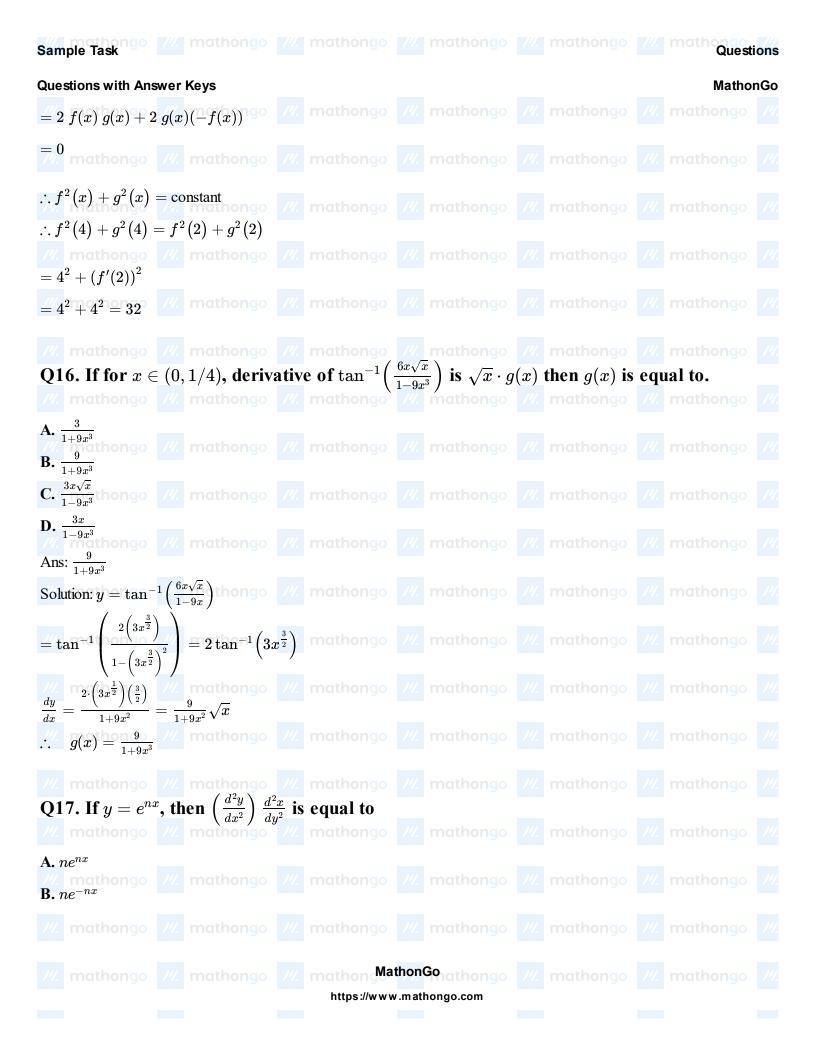
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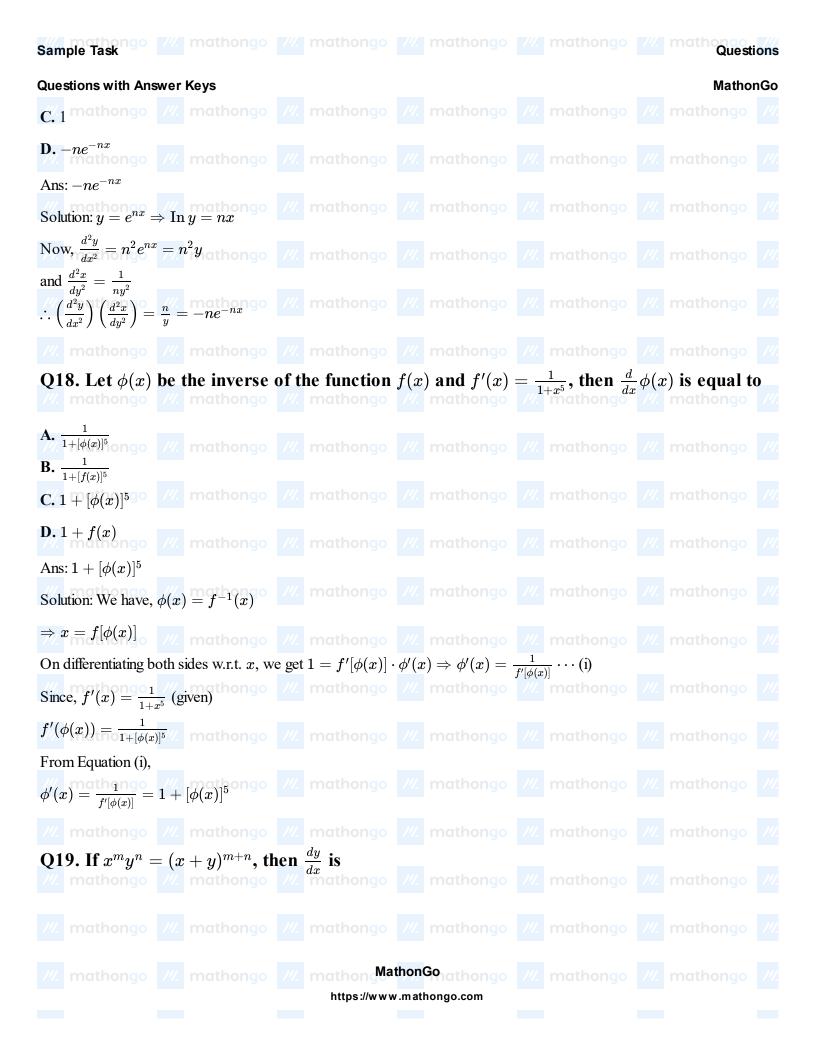
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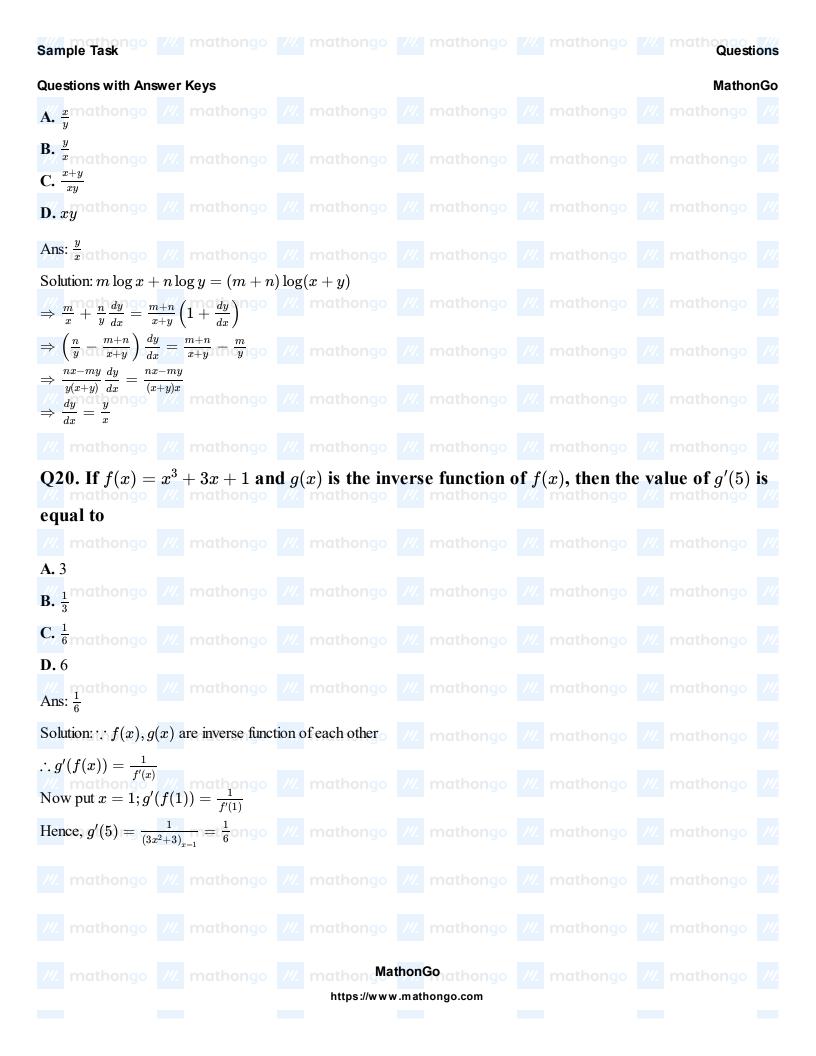


Sample Task Mathongo Questions with Answer Keys MathonGo $\implies x^4y^2 \frac{dy}{dx} = -x^3y^3$. mathongo /// mathongo /// mathongo /// mathongo /// $\Rightarrow x^4y^2\frac{dy}{dx} = -4$...[From(i)] ongo /// mathongo /// mathongo /// mathongo /// Q12. Let f(x) be a polynomial of degree 3 such that $fig(3)=21, f'ig(3)=30, f^{''}ig(3)=22$ and $f^{""}(3)=6$. Find the value of f'(2). Ans: 11 Solution: thongo /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo /// Let $f(x) = a(x-3)^3 + b(x-3)^2 + c(x-3) + d$ wathongo we mathongo we mathongo with mathongo with mathongo. $f(3) = 21 \Rightarrow d = 21$ mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo ///. $f'(3) = 30 \Rightarrow c = 30$ mathongo ///. mathongo ///. mathongo ///. mathongo ///. $f''(3) = 22 \Rightarrow b = 11$ mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo ///. $f'''(3) \cong 6 \Rightarrow a = 1$ mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo ///. $f(x) = (x-3)^3 + 11(x-3)^2 + 30(x-39)^2 + 21$ /// mathongo /// mathongo /// $\Rightarrow f'(x) = 3(x-3)^2 + 22(x-3) + 30$ mathongo /// mathongo /// mathongo /// #f'(2)t $\triangleq 11$ go ///. mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo ///. Q13. Find the value of (fgh)'(0), if f, g and h are differentiable functions with f(0) = 1, $g(0)=2,\ h(0)=3$ and the derivatives of their pair wise products at x=0 are $(fg)'(0)=6,\ (gh)'(0)=4\ {
m and}\ (hf)'(0)=5.$ mathongo //// mathongo //// mathongo ///// ///. mathongo ///. mathongo ///. mathongMathonGonathongo ///. mathongo ///. mathongo ///. https://www.mathongo.com









Questions with Answer Keys

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Q21. Let $f:(-1,1)\to \mathbf{R}$ be a differentiable function with f(0)=-1 and f'(0)=1. Let

 $g(x) = [f(2f(x) + 2)]^2$ Then g'(0) = athongo /// mathongo /// mathongo ///

 $A_{\bullet,0}^{\prime\prime}$ mathongo $/\!/\!/$ mathongo $/\!/\!/$ mathongo $/\!/\!/$ mathongo $/\!/\!/$ mathongo $/\!/\!/$

B.-2 /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo ///

p/__aathongo /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo ///

Ans: -4 mathongo /// mathongo /// mathongo /// mathongo /// mathongo ///

Solution: g'(x) = 2[f(2f(x) + 2)]f'(2f(x) + 2)(2f'(x))

 $\Rightarrow g'(0) = 2[f(2f(0)+2)]f'(2f(0)+2)\left(2f'(0)\right)^{\text{ngo}}$ /// mathongo /// mathongo ///

 $=4(f(0))f'(0)^2=4(-1)(1)^2=-4$ mathongo /// mathongo /// mathongo /// mathongo ///

Q22. f(x) and g(x) are two differential function on [0,2] such that

f''(x) - g''(x) = 0, f'(1) = 2g'(1) = 4, f(2) = 3g(2) = 9 then f(x) - g(x) at $x = \frac{3}{2}$ is though

B. 2 /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo ///

<u>D''.5</u> mathongo ///. mathongo ///. mathongo ///. mathongo ///. mathongo ///.

Ans: 5 mathongo /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo ///

Solution: $f''(x) - g''(x) = 0 \Rightarrow f'(x) - g'(x) = \text{constant.}$

Putting x=1, we get $f'(1)-g'(1)=C\Rightarrow C=2g'(1)-g'(1)$

= g'(1) = 2 mathongo /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo ///

So $f'(x) - g'(x) = 2 \Rightarrow f(x) - g(x) = 2x + C'$.

Putting x=2 we have $f(2)-g(2)=4+C\Rightarrow 4+$ mathongo /// mathongo /// mathongo ///

 $C'=3g(2)-g(2)=2g(2)=6\Rightarrow C'=6-4=2$ mathongo /// mathongo /// mathongo ///

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