Q1

Thursday, September 17, 2020 1:34 PM

Find the derivative of the function.

$F(x) = (3x^6 + 2x^3)^4$

$F'(x) = 4\left(3x^6 + 2x^3\right)^3\left(18x^5 + 6x^2\right)$

$$F(x) = (3x^6 + 2x^3)^4$$

$$u = 3x^6 + 2x^3$$

$$f(u) = y = u^4$$

$$F'(x) = \frac{dF(x)}{dx} = \frac{dy}{du} \cdot \frac{du}{dx}$$

$$= \frac{dy}{du}(u^4)\,\frac{du}{dx}(3x^6 + 2x^3)$$

$$= 4u^3(18x^5 + 6x^2)$$

$$\boxed{F'(x) = 4(3x^6 + 2x^3)^3\,(18x^5 + 6x^2)}$$

Q2

Thursday, September 17, 2020 4:18 PM

Find the derivative of the function.

$$f(x) = \sqrt{3x + 2}$$

$$f'(x) = \frac{3}{2\sqrt{3x+2}}$$

$$f(x) = \sqrt{3x+2}$$

$$u = 3x + 2$$

$$f(u) = \sqrt{u} = y$$

$$f'(u) = \frac{df(x)}{dx} = \frac{dy}{du} \cdot \frac{du}{dx}$$

$$= \frac{dy}{du}\left(\sqrt{u}\right) \frac{du}{dx}(3x+2)$$

$$= \frac{dy}{du}\left(u^{1/2}\right)(3+0)$$

$$= \frac{1}{2}u^{-1/2}(3)$$

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

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

$$= \frac{3}{2} \cdot \frac{1}{\sqrt{3x+2}}$$

$$\boxed{f'(u) = \frac{3}{2\sqrt{3x+2}}}$$

Q3

Thursday, September 17, 2020 4:30 PM

Find the derivative of the function.

$f(\theta) = \cos(\theta^2)$

$f'(\theta) = \boxed{-2\theta\sin\left(\theta^2\right)}$

$$f(\theta) = \cos\left(\theta^2\right)$$

$$u = \theta^2$$

$$f(u) = \cos(u) = y$$

$$f'(\theta) = \frac{df(\theta)}{d\theta} = \frac{dy}{du} \quad \frac{du}{dx}$$

$$= \frac{dy}{du}\left[\cos(u)\right] \frac{du}{dx}\left(\theta^2\right)$$

$$= -\sin(u)\,(2\theta)$$

$$= -\sin\left(\theta^2\right)(2\theta)$$

$$\boxed{f'(\theta) = -2\theta\sin\left(\theta^2\right)}$$

Q4

Thursday, September 17, 2020 4:41 PM

Find the derivative of the function.

$f(t) = t \sin(\pi t)$

$f'(t) = \boxed{\pi t \cos(\pi t) + \sin(\pi t)}$ ✓

The Product Rule

$$\frac{d}{dx}[f(x)g(x)] = f(x)\frac{d}{dx}[g(x)] + g(x)\frac{d}{dx}[f(x)]$$

$$f(t) = t\sin(\pi t)$$

$$f'(x) = t\frac{d}{dx}\left[\sin(\pi t)\right] + \sin(\pi t)\frac{d}{dx}(t)$$

Apply Chain Rule

$u = \pi t$

$f(u) = \sin(u) = y$

$\frac{d}{dx}[\sin(\pi t)] = \frac{dy}{du}\cdot\frac{du}{dx}$

$$= t\frac{dy}{du}[\sin(u)]\frac{du}{dx}(\pi t) + \sin(\pi t)(1)$$

$$= t[\cos(u)](\pi) + \sin(\pi t)$$

$$\boxed{f'(x) = \pi t\cos(u) + \sin(\pi t)}$$

Q5

Thursday, September 17, 2020 5:13 PM

Find the derivative of the function.

$f(x) = (2x - 2)^4(x^2 + x + 1)^5$

$f'(x) = \boxed{(2x-2)^4 5(x^2+x+1)^4(2x+1) + (x^2+x+1)^5 8(2x-2)^3}$ ✔

The Product Rule

$$\frac{d}{dx}[f(x)g(x)] = f(x)\frac{d}{dx}[g(x)] + g(x)\frac{d}{dx}[f(x)]$$

$$f(x) = (2x-2)^4(x^2+x+1)^5$$

$\downarrow$ productrule

$$f'(x) = (2x-2)^4\frac{d}{dx}(x^2+x+1)^5 + (x^2+x+1)^5\frac{d}{dx}(2x-2)^4$$

Chain Rule

$u = x^2 + x + 1$

$f(u) = u^5 = y$

$\frac{dy}{du} \cdot \frac{du}{dx}$

Chain Rule

$u = 2x - 2$

$f(u) = u^4 = y$

$\frac{dy}{du} \; \frac{du}{dx}$

$$= (2x-2)^4\frac{dy}{du}(u^5)\frac{du}{dx}(x^2+x+1) + (x^2+x+1)^5\frac{dy}{du}(u^4)\frac{du}{dx}(2x-2)$$

$$= (2x-2)^4(5u^4)(2x+1+0) + (x^2+x+1)^5(4u^3)(2-0)$$

$$= (2x-2)^4[5(x^2+x+1)^4](2x+1) + (x^2+x+1)^5[4(2x-2)^3](2)$$

$$\boxed{f'(x) = (2x-2)^4 5(x^2+x+1)^4(2x+1) + (x^2+x+1)^5 8(2x-2)^3}$$

Q6

Thursday, September 17, 2020 8:08 PM

Find the derivative of the function.

$$h(t) = (t + 1)^{2/3}(2t^2 - 3)^3$$

$$h'(t) = (t+1)^{\left(\frac{2}{3}\right)}\left(2t^2-3\right)^2 12t + \left(2t^2-3\right)^3\left(\frac{2}{3\sqrt[3]{t+1}}\right)$$

The Product Rule

$$\frac{d}{dx}[f(x)g(x)] = f(x)\frac{d}{dx}[g(x)] + g(x)\frac{d}{dx}[f(x)]$$

$$h(t) = \underbrace{(t+1)^{2/3}}_{f(x)}\underbrace{(2t^2-3)^3}_{g(x)}$$

↓ Product Rule

$$h'(t) = (t+1)^{2/3}\frac{d}{dx}(2t^2-3)^3 + (2t^2-3)^3\frac{d}{dx}(t+1)^{2/3}$$

Chain Rule

$u = 2t^2 - 3$

$f(u) = u^3 = y$

$\frac{dy}{du} \cdot \frac{du}{dx}$

chain rule

$u = t + 1$

$f(u) = u^{2/3} = y$

$\frac{dy}{du} \quad \frac{du}{dx}$

$$= (t+1)^{2/3}\frac{dy}{du}(u^3)\frac{du}{dx}(2t^2-3) + (2t^2-3)^3\frac{dy}{du}(u^{2/3})\frac{du}{dx}(t+1)$$

$$= (t+1)^{2/3}(3u^2)(4t-0) + (2t^2-3)^3\left(\frac{2}{3}u^{-1/3}\right)(1+0)$$

$$= (t+1)^{2/3}(3u^2)(4t) + (2t^2-3)^3\left(\frac{2}{3}u^{-1/3}\right)$$

$$= (t+1)^{2/3}\left[3(2t^2-3)^2\right]4t + (2t^2-3)^3\left[\frac{2}{3}(t+1)^{-1/3}\right]$$

$$= (t+1)^{2/3}(2t^2-3)^2 12t + (2t^2-3)^3\frac{2}{3}\left(\frac{1}{\sqrt[3]{t+1}}\right)$$

$$\boxed{h'(t) = (t+1)^{2/3}(2t^2-3)^2 12t + (2t^2-3)^3\frac{2}{3\sqrt[3]{t+1}}}$$

Q7

Thursday, September 17, 2020 8:39 PM

Find the derivative of the function.

$$y = \sqrt{\frac{x}{x+1}}$$

$$y' = \boxed{\left(\frac{1}{2\sqrt{\frac{x}{x+1}}}\right)\left(\frac{1}{x^2+2x+1}\right)}$$

The Quotient Rule

$$\frac{d}{dx}\left[\frac{f(x)}{g(x)}\right] = \frac{g(x)\frac{d}{dx}[f(x)] - f(x)\frac{d}{dx}[g(x)]}{[g(x)]^2}$$

$$y = \sqrt{\frac{x}{x+1}}$$

$$\frac{(x+1)(1) - x(1+0)}{(x+1)^2}$$

Chain Rule

$$u = \frac{x}{x+1}$$

$$f(u) = \sqrt{u} = y$$

$$\frac{dy}{du} \cdot \frac{du}{dx}$$

$$y' = \frac{dy}{du}\left(\sqrt{u}\right)\frac{du}{dx}\left(\frac{x}{x+1}\right)$$

Quotient rule

$$= \left(u^{1/2}\right)\left[\frac{(x+1)\frac{d}{dx}(x) - x\frac{d}{dx}(x+1)}{(x+1)^2}\right]$$

$$= \frac{1}{2}u^{-1/2}\left[\overline{\qquad\qquad}\right]$$

$$= \frac{1}{2}\left(\frac{x}{x+1}\right)^{-1/2}\left(\frac{x+1-x}{x^2+2x+1}\right)$$

$$= \frac{1}{2}\left(\frac{1}{\sqrt{\frac{x}{x+1}}}\right)\left(\frac{1}{x^2+2x+1}\right)$$

$$\boxed{y' = \left(\frac{1}{2\sqrt{\frac{x}{x+1}}}\right)\left(\frac{1}{x^2+2x+1}\right)}$$

Q8

Thursday, September 17, 2020 8:52 PM

Find the derivative of the function.

$$y = e^{\tan(\theta)}$$

$$y' = e^{\tan(\theta)}\sec^2(\theta)$$

$$y = e^{\tan(\theta)}$$

$$u = \tan(\theta)$$

$$y' = \frac{d}{dx}(e^u)$$

$$= \frac{d}{du}(e^u)\frac{du}{dx}(\tan\theta)$$

$$y' = e^{\tan\theta}\frac{d}{dx}(\tan\theta)$$

$$\boxed{y' = e^{\tan\theta}\sec^2\theta}$$

Q9

Thursday, September 17, 2020 9:23 PM

Find the derivative of the function.

$f(z) = e^{z/(z-1)}$

$f'(z) = \boxed{e^{\left(\frac{z}{z-1}\right)}\left(-\frac{1}{z^2-2z+1}\right)}$

The Quotient Rule

$$\frac{d}{dx}\left[\frac{f(x)}{g(x)}\right] = \frac{g(x)\frac{d}{dx}[f(x)] - f(x)\frac{d}{dx}[g(x)]}{[g(x)]^2}$$

$$f(z) = e^{z/(z-1)}$$

$$u = \frac{z}{z-1}$$

$$f'(z) = \frac{d}{dx}\left(e^u\right)$$

$$= \frac{d}{du}\left(e^u\right)\frac{du}{dx}\left(\frac{z}{z-1}\right)$$

$$= e^{z/(z-1)}\frac{d}{dx}\left(\frac{z}{z-1}\right)$$

$$= e^{z/(z-1)}\left[\frac{(z-1)\frac{d}{dx}(z) - z\frac{d}{dx}(z-1)}{(z-1)^2}\right] \longrightarrow \text{Quotient Rule}$$

$$= e^{z/(z-1)}\left[\frac{(z-1)(1) - z(1-0)}{(z-1)^2}\right]$$

$$= e^{z/(z-1)}\left(\frac{z-1-z}{z^2-2z+1}\right)$$

$$\boxed{f'(z) = e^{z/(z-1)}\left(-\frac{1}{z^2-2z+1}\right)}$$

Q10

Thursday, September 17, 2020 9:33 PM

Find the derivative of the function.

$F(t) = e^{2t\sin(2t)}$

$F'(t) = \boxed{e^{2t\sin(2t)}\left[4t\cos(2t) + 2\sin(2t)\right]}$

The Product Rule

$$\frac{d}{dx}[f(x)g(x)] = f(x)\frac{d}{dx}[g(x)] + g(x)\frac{d}{dx}[f(x)]$$

$$F(t) = e^{2t\sin(2t)}$$

$$u = 2t\sin(2t)$$

$$F'(t) = \frac{d}{du}\left(e^u\right)\frac{du}{dx}(u)$$

$$= e^u \frac{du}{dx}\left[2t\sin(2t)\right]$$

$$= e^{2t\sin(2t)}\left[2\left(t\frac{d}{dx}\left[\sin(2t)\right] + \sin[2t]\frac{d}{dx}[t]\right)\right] \longrightarrow \text{Product rule}$$

$$= e^{2t\sin(2t)}\left[2\left(t\frac{dy}{du}\left[\sin(u)\right]\frac{du}{dx}[2t]\right) + \sin[2t]\frac{d}{dx}[t]\right)\right]$$

Chain Rule

$u = 2t$

$f(u) = \sin(u) = y$

$\frac{dy}{du}$ $\frac{du}{dx}$

$$= e^{2t\sin(2t)}\left[2\left(t\left[\cos(u)\right]\left[2\right] + \sin[2t]\frac{d}{dx}[t]\right)\right]$$

$$= e^{2t\sin(2t)}\left[2\left(2t\cos[2t] + \sin[2t]\frac{d}{dx}[t]\right)\right]$$

$$= e^{2t\sin(2t)}\left[2\left(2t\cos[2t] + \sin[2t][1]\right)\right]$$

$$= e^{2t\sin(2t)}\left[2\left(2t\cos[2t] + \sin[2t]\right)\right]$$

$$\boxed{F'(t) = e^{2t\sin(2t)}\left[4t\cos(2t) + 2\sin(2t)\right]}$$

Q11

Thursday, September 17, 2020 10:30 PM

The Quotient Rule

$$\frac{d}{dx}\left[\frac{f(x)}{g(x)}\right] = \frac{g(x)\frac{d}{dx}[f(x)] - f(x)\frac{d}{dx}[g(x)]}{[g(x)]^2}$$

$$y = \cos\left(\frac{1-e^{2x}}{1+e^{2x}}\right)$$

Chain Rule

$u = 2x$

$f(u) = e^u = y$

$\frac{dy}{du} \quad \frac{du}{dx}$

Chain Rule

$u = \frac{1-e^{2x}}{1+e^{2x}}$

$f(u) = \cos(u) = y$

$\frac{dy}{du} \cdot \frac{du}{dx}$

$$y' = \frac{dy}{du}[\cos(u)]\frac{du}{dx}\left(\frac{1-e^{2x}}{1+e^{2x}}\right)$$

$$= \frac{(1+e^{2x})\frac{d}{dx}(1-e^{2x}) - (1-e^{2x})\frac{d}{dx}(1+e^{2x})}{(1+e^{2x})^2}$$

$$= \frac{(1+e^{2x})\left[0 - \frac{dy}{du}(e^{2x})\frac{du}{dx}(2x)\right] - (1-e^{2x})\left[0 + \frac{dy}{du}(e^{2x})\frac{du}{dx}(2x)\right]}{(1+e^{2x})^2}$$

$$= \frac{(1+e^{2x})(e^{2x})(-2) - (1-e^{2x})(e^{2x})(2)}{(1+e^{2x})^2}$$

$$= \frac{-(1+e^{2x})2e^{2x} - (1-e^{2x})2e^{2x}}{(1+e^{2x})^2}$$

$$= \frac{-2e^{2x}[(1+e^{2x}) + (1-e^{2x})]}{(1+e^{2x})^2}$$

$$= \frac{-2e^{2x}[1 + \cancel{e^{2x}} + 1 - \cancel{e^{2x}}]}{(1+e^{2x})^2}$$

$$= \frac{-2e^{2x}(2)}{(1+e^{2x})^2}$$

$$= -\frac{4e^{2x}}{(1+e^{2x})^2}$$

$$= [-\sin(u)]\left[-\frac{4e^{2x}}{(1+e^{2x})^2}\right]$$

$$= \sin(u)\left[\frac{4e^{2x}}{(1+e^{2x})^2}\right]$$

$$\boxed{y' = s\left(\frac{1-e^{2x}}{1+e^{2x}}\right)\left[\frac{4e^{2x}}{(1+e^{2x})^2}\right]}$$

Q12

Friday, September 18, 2020 9:39 AM

Find the derivative of the function.

$f(t) = \sin^2(e^{\sin^2(t)})$

$f'(t) = 4\sin\left(e^{\sin^2(t)}\right)\cos\left(e^{\sin^2(t)}\right)e^{\sin^2(t)}\sin(t)\cos(t)$

The Product Rule

$$\frac{d}{dx}[f(x)g(x)] = f(x)\frac{d}{dx}[g(x)] + g(x)\frac{d}{dx}[f(x)]$$

$$f(t) = \sin^2\left(e^{\sin^2[t]}\right)$$
$$= \left(\sin\left[e^{\sin^2(t)}\right]\right)^2$$

Chain Rule

$u = \sin(e^{\sin^2[t]})$

$f'(u) = u^2 = y$

$\frac{dy}{du} \cdot \frac{du}{dx}$

$$f'(t) = \frac{dy}{du}(u^2)\frac{du}{dx}\left[\sin\left(e^{\sin^2[t]}\right)\right]$$

$$= 2u\left(\frac{dy}{dv}[\sin(v)]\frac{dv}{dx}\left[e^{\sin^2(t)}\right]\right)$$

Chain Rule

$v = e^{\sin^2(t)}$

$f(v) = \sin(v)$

$\frac{dy}{dv}\ \frac{dv}{dx}$

Chain rule

$w = \sin^2(t)$

$f(w) = e^w = y$

$\frac{dy}{dw}\ \frac{dw}{dx}$

$$= 2u\left(\left[\cos\left(e^{\sin^2[t]}\right)\right]\frac{dy}{dw}(e^w)\frac{dw}{dx}[\sin(t)]\right)$$

Chain Rule

$a = \sin^2(t)$

$f(a) = a^2 = y$

$\frac{dy}{da}\ \frac{da}{dx}$

$$= 2\left[\sin\left(e^{\sin^2[t]}\right)\right]\left(\left[\cos\left(e^{\sin^2[t]}\right)\right](e^w)\frac{dy}{du}(a^2)\frac{du}{dx}[\sin(t)]\right)$$

$$= 2\left[\sin\left(e^{\sin^2[t]}\right)\right]\left(\left[\cos\left(e^{\sin^2[t]}\right)\right](e^w)(2a)[\cos(t)]\right)$$

$$= 2\left[\sin\left(e^{\sin^2[t]}\right)\right]\left(\left[\cos\left(e^{\sin^2[t]}\right)\right]\left[e^{(\sin^2[t])}\right][2(\sin[t])][\cos(t)]\right)$$

$$= 2\left[\sin\left(e^{\sin^2[t]}\right)\right]\left[\cos\left(e^{\sin^2[t]}\right)\right]\left[e^{(\sin^2[t])}\right]2[\sin(t)][\cos(t)]$$

$$\boxed{f'(t) = 4\sin\left(e^{\sin^2[t]}\right)\cos\left(e^{\sin^2[t]}\right)e^{\sin^2(t)}\sin(t)\cos(t)}$$

Q13

Friday, September 18, 2020 11:30 AM

Find an equation of the tangent line to the curve at the given point.

$y = \sin(\sin(x)), \quad (\pi, 0)$

$\boxed{y = -x + \pi}$

$y = \sin(\sin[x]), \quad (\pi, 0)$

$y'(x) = \sin(\sin[x]) = m$

Chain Rule

$u = \sin(x)$

$f(u) = \sin(u) = y$

$\frac{dy}{du} \cdot \frac{du}{dx}$

$= \frac{dy}{du}(\sin[u]) \frac{du}{dx}(\sin[x])$

$= \cos(u)\cos(x)$

$y'(x) = \cos(\sin[x])\cos(x)$

$y'(\pi) = \cos(\sin[\pi])\cos(\pi)$

$= \cos(0)(-1)$

$= (1)(-1)$

$y'(\pi) = -1 = m$

Point-slope form

$y - y_1 = m(x - x_1)$

$x_1 = \pi$

$y_1 =$

$m = -1$

$y - \pi = -1(x - 0)$

$y - \pi = -x$

$\boxed{y = -x + \pi}$

Q14

Friday, September 18, 2020 11:51 AM

Find the derivative of the function.

$y = \cot^2(\sin(\theta))$

$y' = 2\cot(\sin(\theta))\left(-\csc^2(\sin(\theta))\cos(\theta)\right)$

$$y = \cot^2(\sin[\theta])$$
$$= \left[\cot(\sin[\theta])\right]^2$$

$$y' = \left[\cot(\sin[\theta])\right]^2$$

Chain Rule

$u = \cot(\sin[\theta])$

$f(u) = u^2 = y$

$\frac{dy}{du} \cdot \frac{du}{dx}$

$$y' = \frac{dy}{du}(u^2)\frac{du}{dx}\left[\cot(\sin[\theta])\right]$$

Chain Rule

$v = \sin(\theta)$

$f(v) = \cot(v) = y$

$\frac{dy}{dv} \cdot \frac{dv}{dx}$

$$= 2u\left[\frac{dy}{dv}(\cot[v])\frac{dv}{dx}(\sin[\theta])\right]$$

$$= 2\cot(\sin[\theta])\left[-\csc^2(v)\cos(\theta)\right]$$

$$\boxed{y' = 2\cot(\sin[\theta])\left[-\csc^2(\sin[\theta])\cos(\theta)\right]}$$

Q15

Friday, September 18, 2020 12:10 PM

Find the derivative of the function.

$$y = \cos\left(\sqrt{\sin(\tan(3x))}\right)$$

$$y' = -\frac{3}{2}\sin\left(\sqrt{\sin(\tan(3x))}\right)\left(\sin(\tan(3x))\right)^{-\left(\frac{1}{2}\right)}\cos(\tan(3x))\sec^2(3x)$$

$$y = \cos\left(\sqrt{\sin[\tan(3x)]}\right)$$

k

$$y' = \cos\left(\sqrt{\sin[\tan(3x)]}\right)$$

Chain Rule

$u = \sqrt{\sin(\tan[3x])}$

$f(u) = \cos(u) = y$

$\frac{dy}{du} \quad \frac{du}{dx}$

$$= \frac{dy}{du}\left[\cos(u)\right]\frac{du}{dx}\left[\sqrt{\sin(\tan[3x])}\right]$$

Chain Rule

$v = \sin(\tan[3x])$

$f(v) = \sqrt{v} = y$

$\frac{dy}{dv} \quad \frac{dv}{dx}$

$$= -\sin(u)\left[\frac{dy}{dv}\left(\sqrt{v}\right)\frac{dv}{dx}\left(\sin[\tan(3x)]\right)\right]$$

Chain Rule

$w = \tan(3x)$

$f(w) = \sin(w) = y$

$\frac{dy}{dw} \cdot \frac{dw}{dx}$

$$= -\sin\left(\sqrt{\sin[\tan(3x)]}\right)\left[\frac{dy}{dv}\left(v^{\frac{1}{2}}\right)\frac{dy}{dw}\left(\sin[w]\right)\frac{dw}{dx}\left(\tan[3x]\right)\right]$$

Chain Rule

$a = 3x$

$f(a) = \tan(a) = y$

$\frac{dy}{da} \cdot \frac{da}{dx}$

$$= -\sin\left(\sqrt{\sin[\tan(3x)]}\right)\left[\left(\frac{1}{2}v^{-1/2}\right)\cos(w)\frac{dy}{da}\left(\tan[a]\right)\frac{da}{dx}(3x)\right]$$

$$= -\sin\left(\sqrt{\sin[\tan(3x)]}\right)\left[\left(\frac{1}{2}v^{-1/2}\right)\cos(w)\sec^2(a)(3)\right]$$

$$= -\sin\left(\sqrt{\sin[\tan(3x)]}\right)\left[\left(\frac{1}{2}\left[\sin(\tan[3x])\right]^{-1/2}\right)\cos(w)\sec^2(a)(3)\right]$$

$$= -\sin\left(\sqrt{\sin[\tan(3x)]}\right)\left[\left(\frac{1}{2}\left[\sin(\tan[3x])\right]^{-1/2}\right)\cos(\tan[3x])\sec^2(a)(3)\right]$$

$$= -\sin\left(\sqrt{\sin[\tan(3x)]}\right)\left[\left(\frac{1}{2}\left[\sin(\tan[3x])\right]^{-1/2}\right)\cos(\tan[3x])\sec^2(3x)(3)\right]$$

$$= -\sin\left(\sqrt{\sin[\tan(3x)]}\right)\left[\frac{3}{2}\left(\sin[\tan(3x)]\right)^{-1/2}\cos(\tan[3x])\sec^2(3x)\right]$$

$$\boxed{y' = -\frac{3}{2}\sin\left(\sqrt{\sin[\tan(3x)]}\right)\left(\sin[\tan(3x)]\right)^{-1/2}\cos(\tan[3x])\sec^2(3x)}$$