Name: Richard

QUIZ 10 ♡

MATH 200
October 5, 2022

Directions: Differentiate the functions.

1. $y = e^{6x-4}$

$$\frac{dy}{dx} = e^{6x-4}(6-0) = \boxed{6e^{6x-4}}$$

2. $y = \sqrt{x^2+4}$ $= (x^2+4)^{1/2}$

$$\frac{dy}{dx} = \frac{1}{2}(x^2+4)^{-1/2}(2x+0) = \frac{2x}{2(x^2+4)^{1/2}} = \boxed{\frac{x}{\sqrt{x^2+4}}}$$

3. $z = \cos^2(w)$ $= (\cos(w))^2$

$$\frac{dz}{dw} = 2(\cos(w))^{2-1}(-\sin(w)) = \boxed{-2\cos(w)\sin(w)}$$

4. $y = \left(\frac{x^2\sin(x)}{e^x}\right)^4$ $D_x\left[\left(\frac{x^2\sin(x)}{e^x}\right)^4\right] = 4\left(\frac{x^2\sin(x)}{e^x}\right)^3 D_x\left[\frac{x^2\sin(x)}{e^x}\right]$

$$= 4\left(\frac{x^2\sin(x)}{e^x}\right)^3 \frac{D_x[x^2\sin(x)]e^x - x^2\sin(x)e^x}{(e^x)^2}$$

$$= \boxed{4\left(\frac{x^2\sin(x)}{e^x}\right)^3 \frac{2x\sin(x)+x^2\cos(x)-x^2\sin(x)}{e^x}}$$

5. $D_x\left[\left(e^{\cos(x)+4}\right)^5 + x\right]$ $= D_x\left[\left(e^{\cos(x)+4}\right)^5\right] + D_x[x]$

$$= 5\left(e^{\cos(x)+4}\right)^4 D_x\left[e^{\cos(x)+4}\right] + 1.$$

$$= \boxed{5\left(e^{\cos(x)+4}\right)^4 e^{\cos(x)+4}(-\sin(x)) + 1}$$

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Directions: Differentiate the functions.

1. $y = \sin(7x + \pi)$

$$\frac{dy}{dx} = \cos(7x+\pi)\cdot(7+0) = \boxed{7\cos(7x+\pi)}$$

2. $z = \sqrt[3]{w^3 + 8} = (w^3+8)^{\frac{1}{3}}$

$$\frac{dz}{dw} = \frac{1}{3}(w^3+8)^{-\frac{2}{3}}(3w^2+0) = \frac{3w^2}{3(w^3+8)^{2/3}} = \boxed{\frac{w^2}{\sqrt[3]{w^3+8}^{\,2}}}$$

3. $y = \sec^2(x) = (\sec(x))^2$

$$\frac{dy}{dx} = 2(\sec(x))^{2-1}\sec(x)\tan(x) = \boxed{2\sec^2(x)\tan(x)}$$

4. $y = \sec\left(x^2\right)$

$$\frac{dy}{dx} = \boxed{\sec(x^2)\tan(x^2)\,2x}$$

5. $D_x\left[\, x\, e^{\tan(3x)+1}\right] = D_x[x]\,e^{\tan(3x)+1} + x\,D_x\left[e^{\tan(3x)+1}\right]$

$$= 1\cdot e^{\tan(3x)+1} + x\,e^{\tan(3x)+1}\,D_x\left[\tan(3x)+1\right]$$

$$= \boxed{e^{\tan(3x+1)} + x\,e^{\tan(3x)+1}\left(\sec^2(3x)\cdot 3+0\right)}$$

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Quiz 10 ◊

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Directions: Differentiate the functions.

1. $y = \sqrt{5x+1} = (5x+1)^{1/2}$

$$\frac{dy}{dx} = \frac{1}{2}(5x+1)^{-1/2}(5+0) = \frac{5}{2(5x+1)^{1/2}} = \boxed{\frac{5}{2\sqrt{5x+1}}}$$

2. $y = \cos(x^2)$

$$\frac{dy}{dx} = -\sin(x^2)\,2x = \boxed{-2x\sin(x^2)}$$

3. $y = \cos^2(x^2) = \left(\cos(x^2)\right)^2$

$$\frac{dy}{dx} = 2\left(\cos(x^2)\right)^{2-1}\left(-\sin(x^2)\,2x\right) = \boxed{-4x\cos(x^2)\sin(x^2)}$$

4. $z = \tan\left(\dfrac{e^w}{w+1}\right)$

$$\frac{dz}{dw} = \sec^2\left(\frac{e^w}{w+1}\right)\frac{e^w(w+1) - e^w(1+0)}{(w+1)^2}$$

$$= \boxed{\sec^2\left(\frac{e^w}{w+1}\right)\frac{we^w}{(w+1)^2}}$$

5. $y = e^{\tan(3x)+x} + x^2$

$$\frac{dy}{dw} = D_x\left[e^{\tan(3x)+x}\right] + D_x\left[x^2\right]$$

$$= e^{\tan(3x)+x}\,D_x\left[\tan(3x)+x\right] + 2x$$

$$= \boxed{e^{\tan(3x)+x}\left(\sec^2(3x)\cdot 3 + 1\right) + 2x}$$

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Directions: Differentiate the functions.

1. $z = \sqrt{4w^2+16}$ $= (4w^2+16)^{1/2}$

$$\frac{dz}{dw} = \frac{1}{2}(4w^2+16)^{-1/2}\cdot 8w = \frac{4w}{(4w^2+16)^{1/2}} = \boxed{\frac{4w}{\sqrt{4w^2+16}}} = \boxed{\frac{2w}{\sqrt{w^2+4}}}$$

2. $y = e^{x^2-x}$

$$\frac{dy}{dx} = \boxed{e^{x^2-x}(2x-1)}$$

3. $y = \sin\left(e^{x^2-x}\right)$

$$\frac{dy}{dx} = \cos\left(e^{x^2-x}\right) D_x\left[e^{x^2-x}\right] = \boxed{\cos\left(e^{x^2-x}\right)e^{x^2-x}(2x-1)}$$

4. $y = \left(4x^5\cos(x)+1\right)^{10}$

$$\frac{dy}{dx} = 10\left(4x^5\cos(x)+1\right)^9 D_x\left[4x^5\cos(x)+1\right]$$

$$= \boxed{10\left(4x^5\cos(x)+1\right)^9\left(20x^4\cos(x) - 4x^5\sin(x)\right)}$$

5. $D_x\left[\dfrac{e^{\tan(x)}}{x}\right] =$

$$= \frac{D_x\left[e^{\tan(x)}\right]x - e^{\tan(x)}D_x[x]}{x^2}$$

$$= \boxed{\frac{e^{\tan(x)}\sec^2(x)\cdot x - e^{\tan(x)}}{x^2}} = \boxed{e^{\tan(x)}\frac{x\sec^2(x)-1}{x^2}}$$