Name: Richard

QUIZ 11

MATH 200
September 26, 2024

1. $D_x\Big[\ln|\cos(x)|\Big] = \dfrac{1}{\cos(x)} D_x\left[\cos(x)\right] = -\dfrac{\sin(x)}{\cos(x)} = \boxed{-\tan(x)}$

2. $D_x\Big[\big(\ln|\sec(x)|\big)^5\Big] = 5\big(\ln|\sec(x)|\big)^4 D_x\Big[\ln|\sec(x)|\Big]$

$= 5\big(\ln|\sec(x)|\big)^4 \dfrac{\sec(x)\tan(x)}{\sec(x)}$

$= \boxed{5\big(\ln|\sec(x)|\big)^4 \tan(x)}$

3. $D_x\Big[4xe^{\sqrt{3x+1}}\Big] = 4e^{\sqrt{3x+1}} + 4x\,D_x\Big[e^{\sqrt{3x+1}}\Big]$ ← product rule

$= 4e^{\sqrt{3x+1}} + 4x\,e^{\sqrt{3x+1}} D_x\Big[\sqrt{3x+1}\Big]$

$= 4e^{\sqrt{3x+1}} + 4x\,e^{\sqrt{3x+1}} \dfrac{1}{2\sqrt{3x+1}} D_x\left[3x+1\right]$

$= \boxed{4e^{\sqrt{3x+1}}\left(1 + \dfrac{3x}{2\sqrt{3x+1}}\right)}$

4. Find the equation of the tangent line to $f(x) = \frac{1}{2}\ln|x|$ at the point $(1, f(1))$.

$f'(x) = \frac{1}{2}\frac{1}{x} = \frac{1}{2x}$

Point: $(1, f(1)) = (1, \frac{1}{2}\ln(1)) = (1,0)$

Slope $f'(1) = \frac{1}{2\cdot 1} = \frac{1}{2}$

Point slope formula:

$y - y_0 = m(x - x_0)$

$y - 0 = \frac{1}{2}(x-1)$

$\boxed{y = \frac{1}{2}x - \frac{1}{2}}$

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1. $D_x\left[\,\ln|x^6-5x^2+1|\,\right] = \dfrac{1}{x^6-5x^2+1}\cdot D_x\left[x^6-5x^2+1\right] = \boxed{\dfrac{6x^5-10x}{x^6-5x^2+1}}$

2. $D_x\left[\,4xe^{\sqrt{3x+1}}\,\right] = 4e^{\sqrt{3x+1}} + 4x\,D_x\left[e^{\sqrt{3x+1}}\right]$

$= 4e^{\sqrt{3x+1}} + 4xe^{\sqrt{3x+1}}\,D_x\left[\sqrt{3x+1}\right] = 4e^{\sqrt{3x+1}}\left(1 + x\,\dfrac{1}{2\sqrt{3x+1}}\cdot 3\right)$

$= \boxed{4e^{\sqrt{3x+1}}\left(1+\dfrac{3x}{2\sqrt{3x+1}}\right)}$

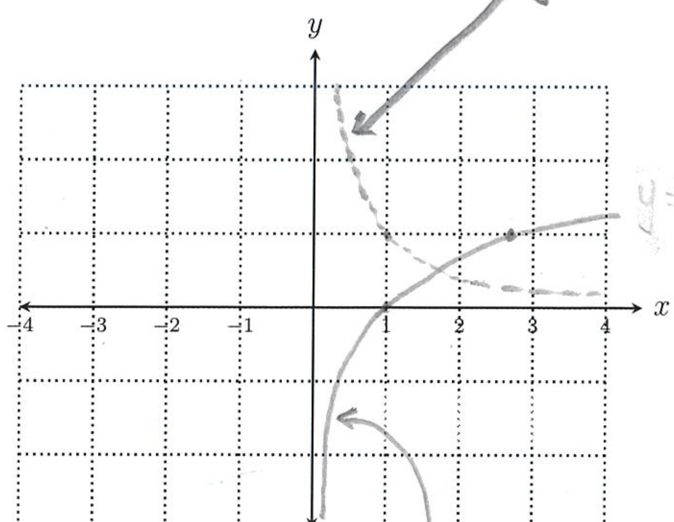
3. $D_x\left[\left(\sec\left(\ln(x)\right)\right)^3\right] = 3\left(\sec(\ln(x))\right)^2\cdot D_x\left[\sec(\ln(x))\right]$

$= \boxed{3\left(\sec(\ln(x))\right)^2\sec(\ln(x))\tan(\ln(x))\,\dfrac{1}{x}}$

$= \boxed{\dfrac{3\left(\sec(\ln(x))\right)^3\tan(\ln(x))}{x}}$

4. Let $f(x) = \ln(x)$. Sketch and label the graphs of both $y = f(x)$ and $y = f'(x)$.

$y = f'(x) = \frac{1}{x}$



$y = f(x) = \ln(x)$