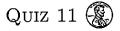
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m MATH}~200$ September 28, 2023

1. Differentiate:
$$f(x) = \ln |5x^3 + 3x^2 + x|$$

$$f(x) = \frac{15x^2 + 6x + 1}{5x^3 + 3x^2 + x}$$

2. Differentiate:
$$y = \frac{1}{\ln(x)} = \left(\frac{1}{\ln(x)} \right)^{-1}$$

$$y' = -\left(\ln\left(x\right)\right) \frac{1}{x} = \left(\frac{-1}{x\left(\ln\left(x\right)\right)^{2}}\right)$$

3. Differentiate:
$$g(x) = \ln\left(\frac{1}{x}\right)$$

$$g(x) = \frac{1}{\chi}Q(\frac{1}{x}) = \chi(\frac{1}{x^2}) = (-\frac{1}{\chi})$$

4. Differentiate:
$$w = x - \frac{xe^x}{\ln(x)}$$

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

$$\frac{dw}{dx} = 1 - \frac{D_x[xe^x] \ln(x) - xe^x D_x[\ln(x)]}{(\ln(x))^2}$$

$$= 1 - \frac{(1 \cdot e^x + xe^x) \ln(x) - xe^x \frac{1}{x}}{(\ln(x))^2} = \frac{e^x((1+x) \ln(x) - 1)}{(\ln(x))^2}$$
Find the equation of the tangent line to the graph of $f(x) = 2 + x \ln(x)$ at the point $(1, f(1))$.

5. Find the equation of the tangent line to the graph of $f(x) = 2 + x \ln(x)$ at the point (1, f(1)).

$$f(x) = 0 + 1 \cdot \ln(x) + x \frac{1}{x} = \ln(x) + 1$$

Slope:
$$m = f(i) = ln(i) + 1 = 0 + 1 = 1$$

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

1. Differentiate: $y = \cos(x) \ln(x)$

$$y' = \left[-\sin(x) \ln(x) + \cos(x) \frac{1}{x} \right]$$

2. Differentiate:
$$f(x) = \cos(\ln(x))$$

$$f(x) = -\sin\left(\ln(x)\right)\frac{1}{x} = \left[-\frac{\sin(\ln(x))}{x}\right]$$

3. Differentiate:
$$g(x) = \ln(\cos(x))$$

$$g(x) = \ln(\cos(x))$$
 $g'(x) = \frac{-\sin(x)}{\cos(x)} = \left[-+\cos(x)\right]$

4. Differentiate:
$$y = 4 + \sqrt{x + x^2 \ln(x)} = 4 + (x + x^2 \ln(x))$$

$$y' = 0 + \frac{1}{2}(x + x^{2}ln(x))^{\frac{1}{2}-1}D_{x}[x + x^{2}ln(x)]$$

$$= \frac{1}{2(x+x^{2}\ln(x))^{1/2}}(1+2x\ln(x)+x^{2}\frac{1}{x}) = \frac{1+2x\ln(x)+x}{2\sqrt{x+x^{2}\ln(x)}}$$

5. Find the equation of the tangent line to the graph of $f(x) = \ln(2x - 1)$ at the point (1, f(1)).

Point:
$$(x_0, y_0) = (1, f(1)) = (1, ln(2.1-1)) = (1, ln(1)) = (1, 0)$$

$$\frac{\zeta'(x)}{2x-1}$$

Slope:
$$m = f(1) = \frac{2}{2 \cdot 1 - 1} = 2$$

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

$$y-0=2(x-i)$$

$$y=2x-2$$