

Key

Quiz 4 TQS 211

Show *all* your work (algebraically or geometrically) for each and simplify. No credit is given without supporting work.

1. For each rule of f given below, find f' .

(a) [2] $f(x) = 2x^3 + \sqrt{x}$

$$\begin{aligned} f'(x) &= 2 \cdot 3x^2 + \frac{1}{2} x^{-\frac{1}{2}} \\ &= 6x^2 + \frac{1}{2} x^{-\frac{1}{2}} \end{aligned}$$

(+1) (+1)

(b) [3] $f(x) = \ln(5x^4 - 2x)$

$$f'(x) = g'(f(x)) \cdot f'(x)$$

$$g(f(x)) = f(x)$$

$$f(x) = 5x^4 - 2x \quad \left| \begin{array}{l} \text{chain} \\ (+1) \end{array} \right.$$

$$g(x) = \ln x$$
$$f'(x) = 20x^3 - 2 \quad \left| \begin{array}{l} \text{der} \\ (+1) \end{array} \right.$$
$$g'(x) = \frac{1}{x}$$

$$\begin{aligned} &= g'(5x^4 - 2x) [20x^3 - 2] \\ &= \frac{1}{5x^4 - 2x} \cdot 20x^3 - 2 \end{aligned}$$

got it (+1)

2. [5] Find the equation of the line tangent to the graph of $f(t) = 3^t$ at $t = 1$.

looking for eq $y = mx + b$

$$m = f'(1) \quad \text{since } f'(t) = (\ln 3) 3^t$$

$$= (\ln 3) 3^1$$

$$= 3 \ln 3$$

line passes through $(1, 3^1) = (1, 3)$

so

$$3 = 3(\ln 3)(1) + b$$

$$b = 3 - 3 \ln 3 = 3(1 - \ln 3)$$

so

$$y = 3(\ln 3)x + 3(1 - \ln 3)$$