

Math 131 - Quiz 6

September 30, 2026

Name key

Score _____

Show all work to receive credit. Supply explanations where necessary.

1. (4 points) Let $f(x) = \frac{2}{x} - \frac{3}{x^2}$. Find an equation of the line tangent to the graph of f at the point where $x = 1$.

$$f(x) = 2x^{-1} - 3x^{-2}$$

$$f'(x) = -2x^{-2} + 6x^{-3}$$

$$\text{Point: } x=1$$

$$y = f(1) = 2 - 3 = -1$$

Slope:

$$m = f'(1) = -2 + 6 = 4$$

Point-Slope Form

$$y + 1 = 4(x - 1)$$

Slope-Int. Form

$$y = 4x - 5$$

2. (4 points) Find each derivative. Do not simplify.

(a) $\frac{d}{dt}(t^3 \tan t) = 3t^2 \tan t + t^3 \sec^2 t$

(b) $\frac{d}{dx} \left(\frac{3 + x + \sqrt[3]{x^5}}{\cos x} \right) = \frac{\left(1 + \frac{5}{3}x^{2/3} \right) (\cos x) - (3 + x + x^{5/3}) (-\sin x)}{\cos^2 x}$

or

$$\frac{\left(1 + \frac{5}{3} \sqrt[3]{x^2} \right) (\cos x) + (3 + x + \sqrt[3]{x^5}) (\sin x)}{\cos^2 x}$$

3. (2 points) Suppose $P(t) = 10t + 300\sqrt{t} + 1850$ gives the population of a small town after t years. Find and interpret $P'(9)$. Give units with your answer.

$$P'(t) = 10 + 150t^{-1/2}$$

$$P'(9) = 10 + \frac{150}{3} = 10 + 50 = 60 \text{ people/year}$$

At $t = 9$ years, the population is growing

At 60 people/year.