

Math 131 - Quiz 5
September 23, 2026

Name key Score _____

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

1. (7 points) Let $f(x) = 5x^2 - 3x + 1$. Use the limit definition of the derivative to determine $f'(x)$.

$$\begin{aligned} f'(x) &= \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} = \lim_{h \rightarrow 0} \frac{[5(x+h)^2 - 3(x+h) + 1] - [5x^2 - 3x + 1]}{h} \\ &= \lim_{h \rightarrow 0} \frac{5x^2 + 10xh + 5h^2 - 3x - 3h + 1 - 5x^2 + 3x - 1}{h} \\ &= \lim_{h \rightarrow 0} \frac{10xh + 5h^2 - 3h}{h} = \lim_{h \rightarrow 0} \frac{h(10x + 5h - 3)}{h} \\ &= 10x - 3 \end{aligned}$$

$$f'(x) = 10x - 3$$

2. (3 points) Use your result from above to find an equation of the line tangent to the graph of $f(x) = 5x^2 - 3x + 1$ at the point where $x = 3$.

Point: $x = 3$

$$\begin{aligned} y &= f(3) = 5(9) - 3(3) + 1 \\ &= 37 \end{aligned}$$

Point-Slope Form:

$$y - 37 = 27(x - 3)$$

Slope:

$$\begin{aligned} f'(3) &= 10(3) - 3 \\ &= 27 \end{aligned}$$

- OR -

Slope-Intercept Form:

$$y = 27x - 44$$