

For every question, write out your computations in the exam booklet.

1. Find the limit, $\lim_{x \rightarrow 1} \frac{x^2 + 2x - 3}{x^2 - x}$.

2. Find the derivatives of the following functions using the basic rules. Do not simplify your answer.

(a) $4x^3 - 5x^{1/3} + 3x^{-2}$ (b) $(x^2 - 3x)e^x$ (c) $\frac{x - 3}{x^2 + x + 1}$.

3. Find the equation of the tangent line to $y = x^3 - 3x$ at $x = 2$.

4. Let $f(x) = \sqrt{x}$.

(a) Find the average rate of change of $f(x)$ over the interval $4 \leq x \leq 9$.

(b) Find the instantaneous rate of change of $f(x)$ at $x = 4$.

5. Let $f(x) = \frac{1}{x}$.

(a) Write the derivative, $f'(5)$, as the limit of the difference quotient.

(b) Evaluate this limit to find $f'(5)$.

6. Use the table below, which shows values of $f(x)$ for x near 2.5,

x	2.3	2.4	2.5	2.6	2.7
$f(x)$	1.41	1.40	1.38	1.35	1.31

to find the slope of a secant line that is an estimate for $f'(2.5)$.

Why did you choose the line you did?