

MAT 129 –003

Fall 2009

Test One

Calculators may not be used on this test.

$$1. f(x) = \begin{cases} x+1 & x \leq 1 \\ \frac{1}{x} & 1 < x < 3. \text{ Determine} \\ \sqrt{x-3} & x \geq 3 \end{cases}$$

1a. $\lim_{x \rightarrow 1^-} f(x)$.

1b. $\lim_{x \rightarrow 1^+} f(x)$.

1c. $\lim_{x \rightarrow 1} f(x)$.

2. Determine $\lim_{x \rightarrow -4} \frac{x^2 + 5x + 4}{x^2 + 3x - 4}$.

3. Determine $\lim_{x \rightarrow 0} \frac{\sin 4x}{\sin 6x}$.

4. Use the limit definition of derivative to calculate $f'(x)$ where $f(x) = x^2 - 8x + 9$.

For the remaining problems, you do not need to use the limit definition of derivative.

5. Determine $f'(x)$ where $f(x) = x^2 - \frac{1}{\sqrt[4]{x^5}}$.

6. Determine $f'(x)$ where $f(x) = \frac{x^2 + x - 2}{x^3 + 6}$.

7. Find the point(s) on the curve $y = x^3 - x^2 - x + 1$ where the tangent line is horizontal.

8. Write an equation of the tangent line to $y = 1 - x^3$ at $(0, 1)$.

9. The position of a particle is given by $s = t^3 - 4.5t^2 - 7t$.

When does the velocity reach 5 m/s?