

MAT 129 – 002, 003

Fall 2009

Review for Test One

Calculators may not be used on this test.

$$1. f(x) = \begin{cases} x^3 + 1 & x \leq 0 \\ -x + 1 & 0 \leq x < 2. \text{ Determine} \\ -x^2 + 10x - 15 & x \geq 2 \end{cases}$$

1a. $\lim_{x \rightarrow 2^-} f(x)$.

1b. $\lim_{x \rightarrow 2^+} f(x)$.

1c. $\lim_{x \rightarrow 2} f(x)$.

1d. $\lim_{x \rightarrow 0} f(x)$.

1e. Is $f(x)$ continuous at $x = 0$? Why or why not?

1f. Is $f(x)$ continuous at $x = 2$? Why or why not?

2. Determine $\lim_{x \rightarrow 2} \frac{3x^2 - 4x - 4}{2x^2 - 8}$.

3. Determine $\lim_{x \rightarrow 0} \frac{\tan 6x}{\sin 2x}$.

4. Use the limit definition of derivative to calculate $f'(x)$ where $f(x) = 4x^2 - 7$.

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

5. Determine $f'(x)$ where $f(x) = \sqrt[4]{x} + \sqrt[3]{x^5}$.

6. Determine $f'(x)$ where $f(x) = (x^{-1} + 2)(x^{3/2} + 1)$.

7. Determine $f'(x)$ where $f(x) = \frac{x^4 + 2x + 1}{x + 1}$.

8. Find the point(s) on the curve $y = x^2 + 3x - 7$ where the slope of the tangent line is 4.

9. Write an equation of the tangent line to $y = 3x^2 - 5x$ at $(2, 2)$.

10. If a ball is thrown vertically upward with a velocity of 80 ft/s, then its height after t seconds is $s = 80t - 16t^2$.

10a. What is the velocity of the ball when it is 96 feet above the ground on its way up?

10b. On its way down?