EXAM 1 - MATH 112 Your Name:

Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. Consider the function
$$f(x) = \begin{cases} \frac{x^2 - 12x + 35}{x^2 - 18x + 65}, & \text{if } x < 5\\ \frac{1}{\sqrt{x + 11}}, & \text{if } x > 5 \end{cases}$$
 Compute the quantities
$$\lim_{x \to 5^-} f(x) = \\\lim_{x \to 5^+} f(x) = \\\lim_{x \to 5} f(x) = \\f(5) = \end{cases}$$

Is y = f(x) continuous at x = 5? Please, provide a short precise justification.

2. Let $f(x) = \frac{1}{x-7}$. Use the limit definition of the derivative to calculate f'(9).

3. Find an equation for the tangent line to the graph of $y = \frac{x+2}{x-1}$ at x = 4.

4. Suppose that the displacement function of a particle moving on a straight line is given by $s(t) = 2t^3 + 5t^2 + 7$, where t is measured in seconds and s(t) is measured in meters. Find the velocity of the particle 2 seconds into its motion.

5. A language school has found that its students can memorize $p(t) = 24\sqrt{t} + 8\sqrt{t^3}$ phrases in t hours of class, for $0 \le t \le 10$. Find the instantaneous rate of change of this quantity after 4 hours of class.