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 $f(x) = \begin{cases} -x^2 4x, & \text{if } x \leq -1 \\ x + 1, & \text{if } x > -1 \end{cases}$
 - (a) Sketch the graph of y = f(x); make sure to label all important points.

(b) Compute the quantities

$$\lim_{x \to -1^{-}} f(x) =$$
$$\lim_{x \to -1^{+}} f(x) =$$
$$\lim_{x \to -1} f(x) =$$
$$f(-1) =$$

2. Let $f(x) = 3\sqrt{2x-1}$. Use the **limit definition of the derivative** to calculate f'(5).

3. Find an equation for the tangent line to the graph of $y = \frac{2x+6}{x-2}$ at x = 7.

4. 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.

5. Suppose
$$f(x) = \sqrt[3]{x} - \frac{1}{\sqrt[3]{x^2}}$$
. Find $f''(-1)$.