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 $f(x) = \begin{cases} \dfrac{-x^2 + 3x - 2}{x - 2}, & \text{if } x < 2 \\ \sqrt{x + 2}, & \text{if } x \geq 2 \end{cases}$ Compute the quantities

$$\lim_{x \to 2^-} f(x) \quad =$$

$$\lim_{x \to 2^+} f(x) \quad =$$

$$\lim_{x \to 2} f(x) \quad =$$

$$f(2) \quad =$$

Is $y = f(x)$ continuous at $x = 2$? Please, explain briefly.

2. Suppose $f(x) = 3x^2 - 2x$. Use the limit definition of the derivative to calculate $f'(2)$.

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

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

5. Suppose that a manager of a music store estimates that the number of used CDs that his store will sell per day at a price of $ x$ each is given by $S(x) = \dfrac{810}{x + 4}$. Find the rate of change of this quantity when the price is $ 5.00 per CD and briefly explain how your answer should be interpreted.