Name: _____ _____ / 25

There are 25 points possible on this quiz. No aids (book, calculator, etc.) are permitted. **Show all work for full credit.**

1. **[8 points] Use the limit definition of the derivative** to find the derivative of $g(x) = 10 - \frac{1}{x}$. No credit will be awarded a solution that does not use the definition below.

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

2. **[6 points]** The distance in feet that a remote controlled car moves along a straight sidewalk is modeled by the function $s(t) = 5t^2 + t$, where t is measured in seconds after the car begins moving.

   a. Find the average velocity of the car over the time interval from $t = 1$ to $t = 3$. Include units with your answer.

   b. Find the instantaneous velocity of the car when $t = 1$. Include units with your answer.

3. [5 points] The graph of $f(x)$ is below. On the same set of axes, make a rough sketch of the graph of $f'(x)$.
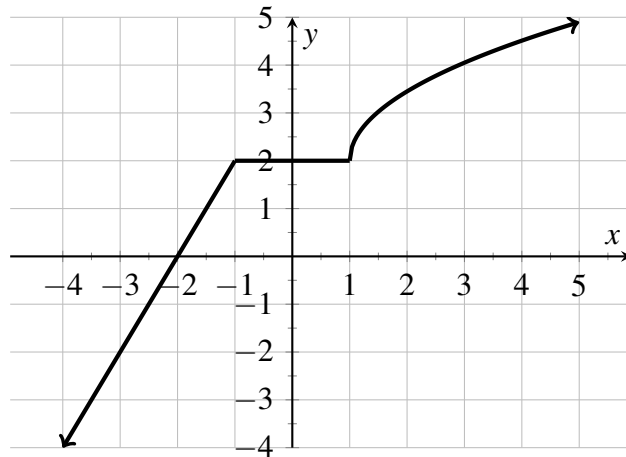
4. [6 points points] Find the derivative for each function below. You do not need to simplify.

a. $g(x) = 4\cos(x) + \frac{9}{x^2} + \sqrt{x} + 2$

b. $f(x) = \sqrt{x}(x^2 + 1)$