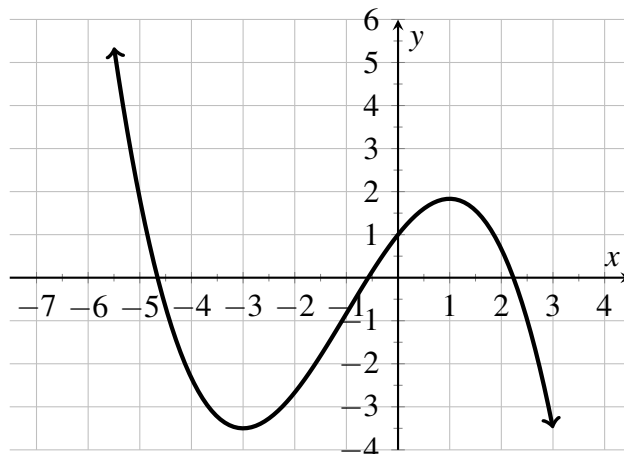**Name:** ———————————————————————————————   ———————— / 25

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

1. **[4 points]** The function $C(y) = \frac{18(1+y)}{2y+5}$ models a herd of caribou where C is the number of caribou in hundreds and y is measured in years starting in the year 2000.

   a. Observe that $C(10) = 7.92$. Interpret this fact in the context of the problem. To earn full credit your answer should be a complete sentence and must include units.

   b. It can be shown that $C'(10) = 0.0864$. Interpret this fact in the context of the problem. To earn full credit your answer should be a complete sentence and must include units.

2. **[4 points]** The function $y = H(x)$ is graphed below. Sketch the graph of $H'(x)$ on the same set of axes.

3. **[9 points]** Find the derivative of $f(x) = 3\sqrt{x}$ **using the limit definition of the derivative.** No credit will be given for an answer that uses the power rule.

4. **[8 points]** For each function below, find its derivative. You may use any method you like. You do not have to simplify your answer.

    a. $f(x) = \frac{x^3 + x - \pi^2}{3}$

    b. $g(x) = x\left(\frac{1}{x^2} + \frac{1}{x}\right)$