

Name: _____ / 25

There are 25 points possible on this quiz. *You should be able to complete it without using your notes or textbook – this is practice for your exams!* If you needed to look something up, you should to me about questions you might have. **Show all work for full credit** and use some words or sentences to help communicate your answers. **Do not use a calculator.**

1. [8 points] Use the **limit definition** of the derivative to find the derivative of $g(x) = x + \frac{3}{x}$. **No credit will be awarded a solution that does not use the definition below.** Show all your work clearly, step by step, using correct notation.

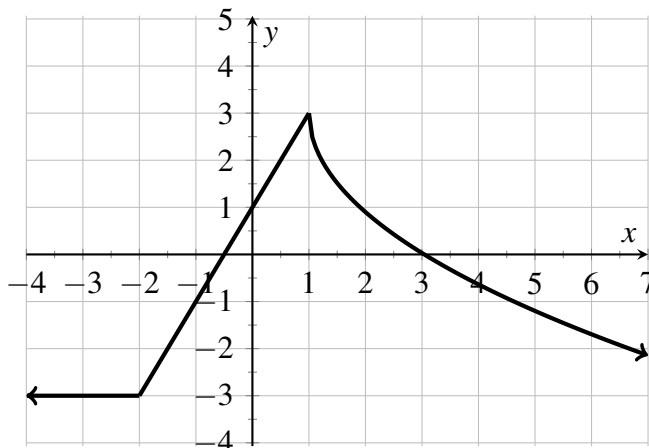
$$g'(x) := \lim_{h \rightarrow 0} \frac{g(x+h) - g(x)}{h}$$

2. [6 points] A ball is thrown upwards into the air. Its height, in feet, after t seconds is given by the function $s(t) = 40t - 16t^2$

a. Find the average velocity of the ball over the time interval from $t = 1$ to $t = 2$. Include units with your answer.

b. Find the instantaneous velocity of the ball when $t = 2$. 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 $f'(x)$. If they exist, indicate any asymptotes with dashed lines. Use open circles to show points where the derivative is not defined, if any. *Make sure you are writing darkly enough that I can see your graph clearly! (Double-check your scan before you submit.)*



4. [6 points] Use the derivative rules to find the derivative for each function below. **Do not simplify your answer.**

a. $f(x) = (\sin x)(3x^2 - 5x + 6)$

b. $g(x) = 4x^{1/5} + \frac{9}{x^3} + \sqrt{3} + 10x$