Grade: /10

AMAT112: Calculus I
Worksheet 2

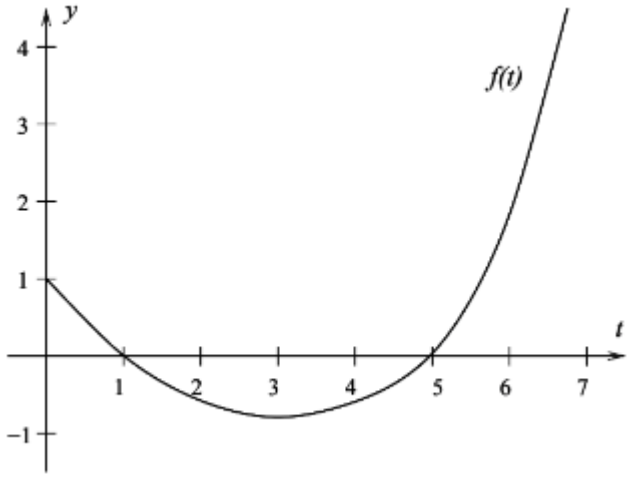
Due: Friday, February 16, in Class or digitally

Name:
UAlbany Email:

—— Instructions ——

- This homework should be submitted in class or digitally on the date listed above.
- There are three main ways you might want to write up your work.
  - Write on this pdf using a tablet
  - Print this worksheet and write in the space provided
  - Write your answers on paper, clearly numbering each question and part.
    - If using either of the last two options, you can use an app such as Microsoft Lens to take pictures of your work with your phone and convert them into a single pdf file.
- **You must show all work**. You may receive zero or reduced points for insufficient work. **Your work must be neatly organized and written**. You may receive zero or reduced points for incoherent work.
- If you are writing your answers on anything other than this sheet, you should only have **one question per page**. You can have parts a), b) and c) on the page for example, but problems 1) and 2) should be on separate pages.
- **Put a box or circle around your final answer** for each question.
- The problems on this assignment will be **graded on correctness and completeness**.
- These problems are designed to be done without a calculator. Whilst there is nothing stopping you using a calculator when working through this assignment, be aware of the fact that you are not permitted to use calculators on exams so you might want to practice without one.

1. The function $y = f(t)$, shown in the figure below, represents the displacement of an object along the y-axis. .



For each of the following pairs of numbers, circle the greater one. You do not need to justify your answer.

(a) the average velocity from $t = 2$ to $t = 3$ OR the average velocity from $t = 3$ to $t = 4$

(b) $\dfrac{f(2)}{2}$ OR the average velocity from $t = 1$ to $t = 2$

(c) the instantaneous velocity at $t = 2$ OR the average velocity from $t = 2$ to $t = 3$

(d) $\lim\limits_{h\to 1} \dfrac{f(4+h) - f(4)}{h}$ OR $\lim\limits_{h\to 0} \dfrac{f(4+h) - f(4)}{h}$

(e) $f(6)$ OR $f'(6)$

2. (a) Evaluate the limit:

$$\lim_{x \to 8} \frac{2x^2 - 17x + 8}{8 - x}$$

(b) Find the value of k such that the limit exists and evaluate the limit for that value of k.

$$\lim_{x \to k} \frac{\sqrt{x} - 2}{x - k}$$

3. Find and classify all points of discontinuity for the functions below.

(a) $f(t) = \dfrac{t^2 - 9}{3t^2 + 2t - 8}$

(b) $h(x) = \dfrac{x}{7 - e^{2x+3}}$

4. Use the Intermediate Value Theorem to show that $t^2 - 4\ln(5t + 2) = 0$ has at least one root on the interval $[0, 4]$

5. Each of the following limits represents the derivative of a function f at some value a. Based on the graph of $y = f(x)$ and the value of a, circle the correct answer. Explain your reasoning using the limit definition of the derivative at a point and the slope of a tangent line.

(a) $\lim_{h\to 0} \dfrac{\cos(h+\pi)+1}{h}$ is

i. positive

ii. zero

iii. negative

(b) $\lim_{h\to e} \dfrac{\ln(h)-1}{h-e}$ is

i. positive

ii. zero

iii. negative