

Your Name

Your Signature

Student ID #

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	Sasha	Mo
Section (Thurs.)	2:30	2:30 1:30
(circle one)	LA	LB LC

Problem	Total Points	Score
1	12	
2	8	
3	6	
4	8	
5	6	
6	10	
Total	50	

- This exam is closed book. You may use one $8\frac{1}{2} \times 11$ sheet of notes.
- Do not share notes.
- Graphing calculators are not allowed.
- In order to receive credit, you must show your work. Do not do computations in your head. Instead, write them out on the exam paper.
- Place a box around **YOUR FINAL ANSWER** to each question.
- If you use a trial and error (or guess and check) method when an algebraic method is available, you will not receive full credit.
- If you need more room, use the backs of the pages and indicate to the reader that you have done so.
- Raise your hand if you have a question.

1 (12 points) Determine if the following limits exist. If they exist, compute them. Justify your answers.

(a) (4 points) $\lim_{x \rightarrow 2} \frac{2x^2 - 7x - 4}{x - 2}$

(b) (4 points) $\lim_{x \rightarrow -\infty} \frac{\sqrt{5x^4 + 6}}{x^2 - 3x}$

(c) (4 points) $\lim_{x \rightarrow -2} \frac{\frac{1}{x} + \frac{1}{2}}{2 + x}$

2 (8 points) Compute the derivatives of the following functions using the differentiation formulas.

(a) (4 points) $f(x) = e^x \sqrt{x^3}$

(b) (4 points) $g(x) = \frac{x + 1}{x^2 + x + 1}$

3 (6 points) Patrick throws a tomato into the air. The height y of the tomato at time t is given by $y = -16t^2 + 20t + 6$. (Units are feet and seconds.) Compute the average velocity of the tomato between $t = 0.9$ and $t = 1$.

- 4 (8 points) A particle is travelling in the plane and its position is given by the parametric equations

$$\begin{cases} x = 3 + t \\ y = 7 - 2t \end{cases}$$

Compute the time when the particle is closest to the point $(2, -1)$.

- 5 (6 points) Define $F(x)$ by the piecewise formula $F(x) = \begin{cases} 7x - 10 & \text{if } x < 2; \\ x^2 & \text{if } x \geq 2. \end{cases}$

Is $F(t)$ a continuous function? Justify your answer. (Your justification should involve limits).

6 (10 points) Find the derivative of the function $G(t) = \frac{1}{2t+1}$ using the definition of the derivative. Do not use any differentiation formulas.