

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	8	
4	7	
5	8	
6	7	
Total	50	

- This exam is closed book. You may use one $8\frac{1}{2} \times 11$ sheet of notes.
- Do not share notes.
- 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.

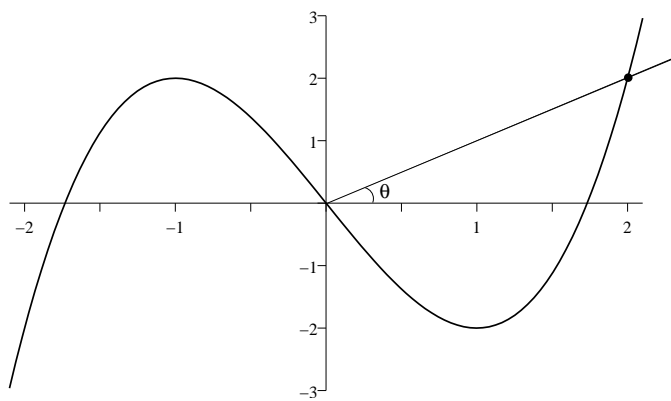
1 (12 points) Compute the derivatives of the following functions. Do not simplify your answers.

(a) (4 points) $f(x) = \tan^{-1}(\ln(x^3 + 5))$

(b) (4 points) $g(t) = \sin\left(\frac{e^t}{\cos(t)}\right)$

(c) (4 points) $y = x^{x \sec(x)}$

- 2 (8 points) A particle in the first quadrant moves along the curve $y = x^3 - 3x$ in such a way that the x -coordinate of its position P increases at a steady 7 cm/sec. Let ℓ be the line joining P to the origin. How fast is the angle of inclination of ℓ changing when $x = 2$ centimeters? (The angle of inclination of a line is the angle it makes with the positive x -axis.)



- 3 (8 points) Consider the curve with equation $x^2 + 2xy + y^3 = 0$. Find the coordinates of all points where the tangent line to the curve is horizontal.

- 4 (7 points) Find the maximum and minimum values of $g(x) = x^4 - 2x^2 + 5$ on the interval $[-2, 2]$

5 (8 points) A weight is hanging from a spring. It is bouncing up and down so that its height in inches above the ground after t seconds is given by $y = 6 + 2 \sin\left(\frac{2\pi}{5}(t - 2)\right)$. During the first 5 seconds, calculate the acceleration of the weight at the times when the velocity is zero.

6 (7 points) Find the linearization of the function $f(x) = \sqrt{x^3 + 1}$ at $a = 2$. Use it to approximate $f(1.98)$.