

Calculus I

Name: \_\_\_\_\_

Study Guide 19

Class: \_\_\_\_\_

Due Date: \_\_\_\_\_

Score: \_\_\_\_\_

No Work  $\Leftrightarrow$  No Points

Use Pencil Only  $\Leftrightarrow$  Be Neat & Organized

---

1. (5 points) At a certain instant each edge of a cube is 5 inches long and the volume is increasing at the rate of  $2 \text{ ft}^3/\text{min}$ . How fast the surface area of the cube increasing?

- 
2. (4 points) If functions  $f(x)$  and  $g(x)$  are positive and increasing on an interval  $I$ . Show  $h(x) = f(x) \cdot g(x)$  is increasing on the interval  $I$ .

- 
3. (4 points) Find  $f(x)$  such that  $f'(x) = 5x^4 + \sec x \tan x$  and  $f(0) = 5$ .

4. (3 points) State the First Derivative Test clearly.

---

5. (5 points) Find all relative extrema of  $f(x) = -3x^{5/3} + 15x^{2/3}$ .

5. \_\_\_\_\_

6. (3 points) State the Second Derivative Test clearly.

---

7. (5 points) Find all critical points and inflection points for  $f(x) = x^4 - 6x^2 - 3$ .

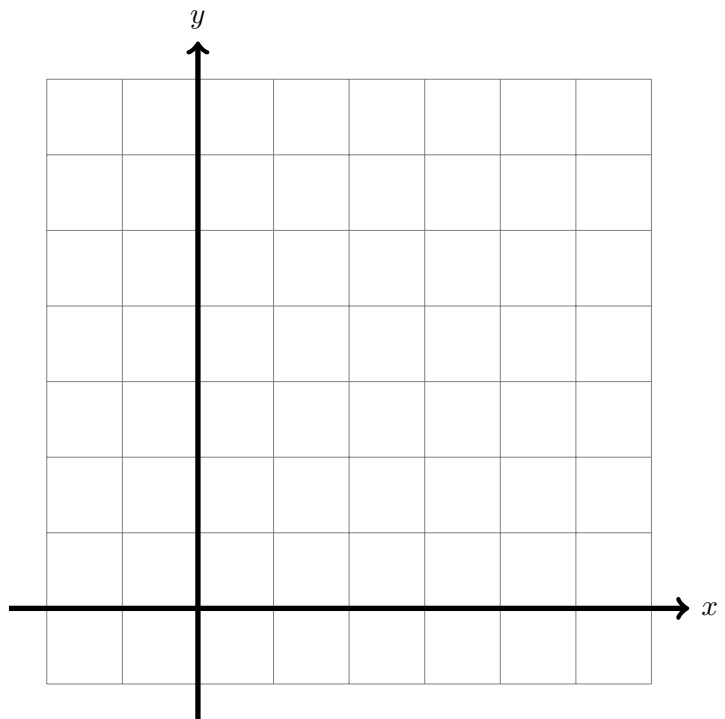
7. \_\_\_\_\_

8. (5 points) A rectangle has its two lower corners on the  $x$ -axis and its two upper corners on the curve  $y = 16 - x^2$ . For all such rectangles, what are the dimensions of the one with the largest area? Drawing Required.

---

8. \_\_\_\_\_

9. (8 points) Graph  $f(x) = 2 \cos^2 x$  on  $0 \leq x \leq \pi$ . Make sure you show all steps as we did in class, label all your points, and clearly identify any critical points and inflection points.



10. (8 points) Graph  $f(x) = \frac{x^2 - 4}{x^2}$ . Make sure you show all steps as we did in class, label all your points, and clearly identify any critical points and inflection points.

