

Calculus I

Name: _____

Study Guide 20

Class: _____

Due Date: _____

Score: _____

No Work \Leftrightarrow No Points

Use Pencil Only \Leftrightarrow Be Neat & Organized

-
1. (5 points) Find the slope of the normal line to the curve $y = x \tan\left(\frac{\pi y}{2}\right)$ at the point $\left(\frac{1}{2}, \frac{1}{2}\right)$.

1. _____

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2. (4 points) Verify that the hypotheses of Rolle's Theorem are satisfied for the function $f(x) = \frac{1}{2}x - \sqrt{x}$ on the interval $[0, 4]$, and find all values of c in the given interval that satisfy the conclusion of the theorem.

2. _____

3. (5 points) Verify that the hypotheses of the Mean-Value Theorem are satisfied for the function $f(x) = \sqrt{x-1} + 1$ on the interval $[2, 10]$, and find all values of c in the given interval that satisfy the conclusion of the theorem.

3. _____

4. (8 points) A box with a square base is taller than it is wide. In order to send the box through the U.S. mail, the height of the box and the perimeter of the base can sum to no more than 108 inches. What is the maximum volume for such a box?

4. _____

5. (5 points) Find the point on the line $2x - 4y = 3$ that is the closest to the origin.

5. _____

6. (5 points) Verify that the hypotheses of Rolle's Theorem are satisfied for the function

$f(x) = \frac{x^2 - 1}{x - 2}$ on the interval $[-1, 1]$, and find all values of c in the given interval that satisfy the conclusion of the theorem.

6. _____

7. (5 points) Find the point on the curve $x = y^2$ that is the closest to the the point $(0, 18)$.

7. _____

8. (5 points) Verify that the hypotheses of the Mean-Value Theorem are satisfied for the function $f(x) = \sqrt{25 - x^2}$ on the interval $[-5, 3]$, and find all values of c in the given interval that satisfy the conclusion of the theorem.

8. _____

9. (8 points) Find the height and the radius of the cone with slant height of $\sqrt{12}$ whose volume is as large as possible.

9. _____