

Calculus I

Name: _____

Study Guide 19

Class: _____

Due Date: _____

Score: _____

No Work \Leftrightarrow No Points

Use Pencil Only \Leftrightarrow Be Neat & Organized

-
1. (4 points) Prove if $f(x)$ is differentiable at a , then $f(x)$ is continuous at a .

-
2. (4 points) Find the equation of the tangent line to the graph of $\sqrt{x} + \sqrt{y} = 5$ at the point $(4, 9)$.

2. _____

3. (4 points) For $\epsilon = .1$, find $\delta > 0$ such that $\lim_{x \rightarrow -2} (x^2 + 4) = 8$.

3. _____

4. (3 points) State the Rolle's Theorem clearly.

5. (5 points) Verify that the hypotheses of the Rolle's Theorem are satisfied for the function $f(x) = \sin x$ on the interval $[-\pi, \pi]$, and find all values of c in the given interval that satisfy the conclusion of the theorem.

5. _____

6. (3 points) State the Mean-Value Theorem clearly.

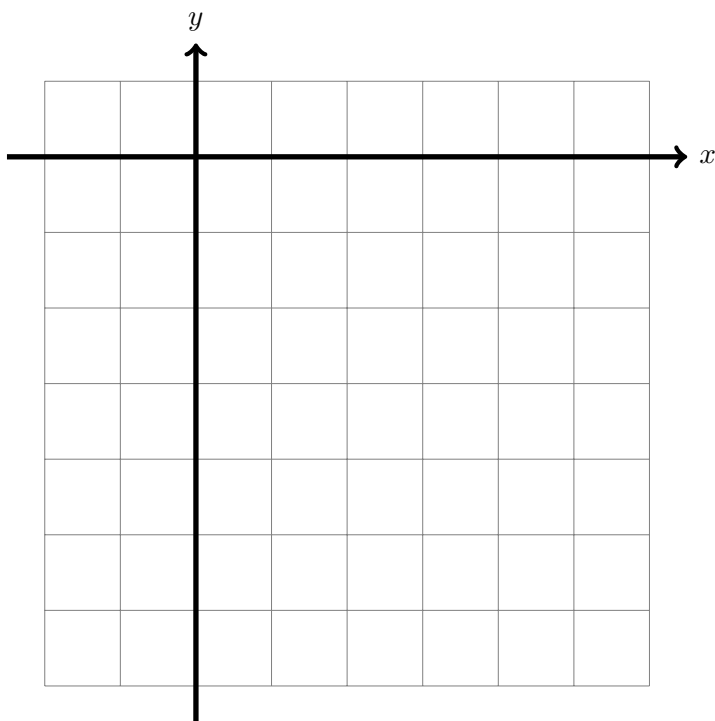
7. (5 points) Verify that the hypotheses of the Mean-Value Theorem are satisfied for the function $f(x) = x^3 + x - 4$ on the interval $[-1, 2]$, and find all values of c in the given interval that satisfy the conclusion of the theorem.

7. _____

8. (4 points) Suppose a forest fire spreads in a circle with area changing at a rate of $25\pi \text{ ft}^2/\text{min}$. When the area reaches 100π feet squared, at what rate is the radius of burning region increases?

8. _____

9. (8 points) Graph $f(x) = x^4 - 4x^3$. 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. (10 points) Graph $f(x) = \frac{x^2 - 1}{x^2 + 1}$. Make sure you show all steps as we did in class, label all your points, and clearly identify any critical points and inflection points.

