

Calculus AP
chapter 3 Study Guide

Name _____
Date _____

1. Find all absolute extrema of $y = x + 2 \sin x$ on $[0, 2\pi]$

minimum $(0, 0)$ maximum $(2\pi, 2\pi)$

2. Find all absolute extrema of $y = \frac{-x^3 + x^2 + 3x + 1}{x+1}$ on $[-1, 2]$.

$(1, 2)$ maximum

3. Let $f(x) = 7 - \frac{6}{x}$. Find all c in $(1, 6)$ such that $f'(c) = \frac{f(b) - f(a)}{b - a}$

$$c = \sqrt{6}$$

4. Determine whether Rolle's theorem applies to $f(x) = \frac{1}{(x-3)^2}$ on $[2, 4]$.

Explain why or why not.

No. not continuous at $x=3$

5. Determine whether the Mean Value theorem applies to $f(x) = \frac{(x^2+2)(2x-1)}{2x-1}$ on $[-1, 3]$. Explain why or why not.

No. not continuous at $x=\frac{1}{2}$

6. Find all intervals on which $f(x) = \frac{x}{x^2+x-2}$ is increasing or decreasing.

$$y' = \frac{-x^2-2}{(x^2+x-2)^2}$$

$$\frac{x}{x^2+x-2}$$

decreasing $(-\infty, -2) \cup (-2, 1)$
 $(1, \infty)$

7. Find all relative extrema of $f(x) = x^3 + x$.

$$x^2 = -\frac{1}{3}$$

no relative extrema

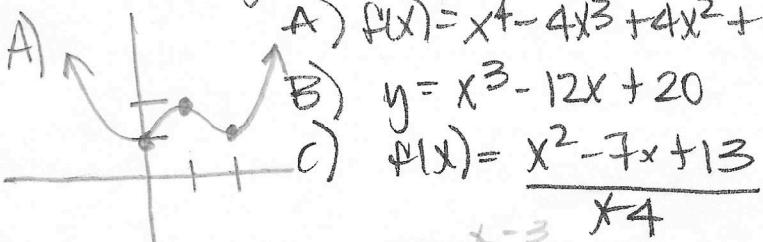
8. Find all points of inflection of the graph of $f(x) = 2x(x-4)^3$.

$$(4, 0) \quad (2, -32)$$

9. Find all intervals on which $f(x) = \frac{x-1}{x+3}$ is concave down.

$$(-3, \infty)$$

10. Analyze the curves. Use the information to sketch a graph of the curve



$$\begin{array}{r} x-3 \\ x-4 | x^2 - 7x + 13 \\ \hline -x^2 + 4x \\ \hline -3x \end{array}$$

