First Derivative Test

Numberbender | WORKSHEET

Name: _____ Date: _____ Score: _____

Find and classify the critical point(s) of each function. Show all work.

CALCULUS I
Worksheet #65

For #1-5

a) Find and classify the critical point(s)
b) Find the interval(s) where f(x) is increasing.
c) Find the interval(s) where f(x) is decreasing.
d) Sketch the graph of f(x).

1. $f(x) = 3x^2 - 3x + 2$	2. $f(x) = x^3 - x^2 - x$
3. $f(x) = 2x^3 - 9x^2 + 2$	4. $f(x) = \frac{x^4}{4} - x^3 + x^2$
5. $f(x) = \frac{x-2}{x+2}$	

6. Find a and b so that $f(x) = x^3 + ax^2 + b$ will have a critical point at (2,3).

7. Give the total number of maximum and minimum points of the function whose derivative is given by $f'(x) = x(x - 3)^2(x + 1)^4$.

8. Find the volume of the solid formed when the area bounded by $x = 3y - y^2$ and $x = 0$ is revolved about the y – axis.

9. Write the equation of the line tangent to the graph of $y = \frac{2x+3}{3x-2}$ at the point (1, 5).

10. $\lim_{x \to 0} \frac{1 - \cos x}{2\sin^2 x}$

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Answer key — for instructor use only.

Answers:

	Rel Min	Rel Max	Increasing	Decreasing
1.	$\left(\frac{1}{2}, \frac{5}{4}\right)$	None	$\left(\frac{1}{2}, \infty\right)$	$\left(-\infty, \frac{1}{2}\right)$
2.	(1, –1)	$\left(-\frac{1}{3}, \frac{5}{27}\right)$	$(1, \infty)$ & $\left(-\infty, \frac{-1}{3}\right)$	$\left(\frac{-1}{3}, 1\right)$
3.	(3, –25)	(0 , 2)	$(-\infty, 0)$ & $(3, \infty)$	$(0, 3)$
4.	(0, 0), (2, 0)	$\left(1, \frac{1}{4}\right)$	$(0,1)$ & $(2, \infty)$	$(-\infty, 0)$ & $(1, 2)$
5.	None	None	all Reals except x = 2	Never
6. a = –3, b = 7		7. one (min. at x =0)	8. $\frac{81\pi}{10}$	9. $y - 5 = -13(x - 1)$
10. $\frac{1}{4}$				