

Ch. 15 - BOARD PROBLEMS

FIND $\frac{dy}{dx}$.

$$\textcircled{1} \quad 2x^3 = 2y^2 + 5$$

$$\textcircled{2} \quad 2x^3 = (3xy + 1)^2$$

$$\textcircled{3} \quad \sin 2x^2 y^3 = 3x^3 + 1$$

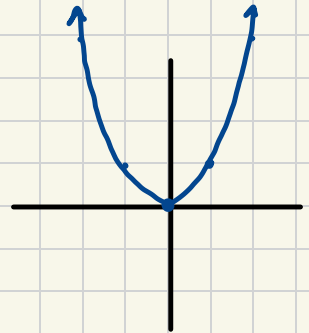
$$\textcircled{4} \quad x^2 = (4x^2 y^3 + 1)$$

Ch. 15 - Graphing with the 1st Derivative

THE 1st DERIVATIVE GIVES THE SLOPE OF A LINE AT A POINT.

$$y = x^2$$

$$y' = 2x$$



$x > 0$	
x	$f'(x)$
-3	
-2	
-1	
0	

$x < 0$	
x	$f'(x)$
1	
2	
3	
4	

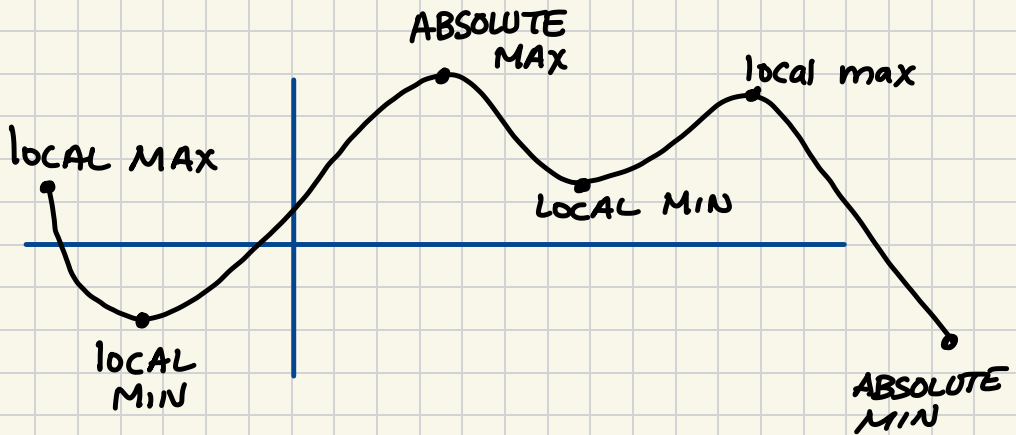
THE SLOPES ARE

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TO FIND THE EXTREME POINTS ON A FIND:

1. THE POINTS WHERE $F' = 0$
2. THE POINTS WHERE F' DNE
3. END POINTS

CRITICAL POINTS



EX. 1

FIND CRITICAL POINTS

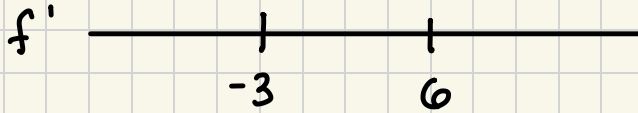
$$f(x) = 2x^3 - 9x^2 - 108x + 3$$

$$f'(x) =$$

SET=0, SOLVE FOR X.

PICK POINTS TO LEFT AND RIGHT OF CRITICAL POINTS

INTERVALS



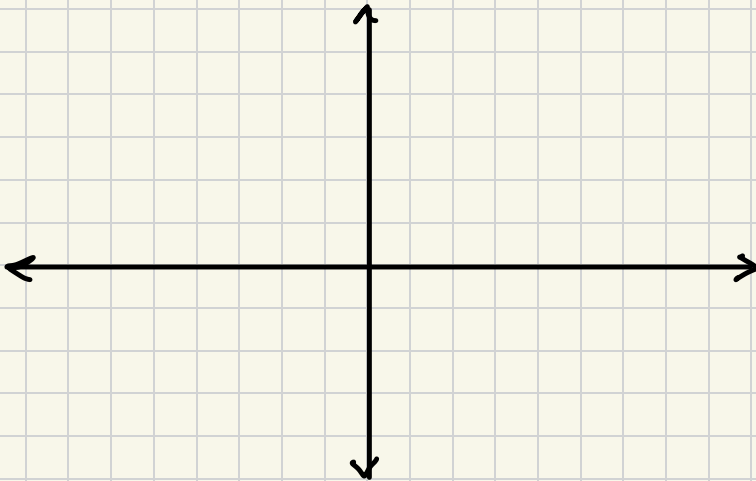
PLACE CRITICAL POINTS BACK INTO ORIGINAL EQUATION.

$$f(-3) =$$

$$f(6) =$$

NOTICE WHERE $f(x)$ IS INCREASING/DECREASING.

PLOT.



EX. 2

FIND INTERVALS WHERE

$$f(x) = 3x^4 - 4x^3 - 12x^2 + 5$$

GIVE COORDINATES OF MINIMUM/MAX
VALUES

EX. 3

$$f(x) = \frac{2}{x^2 + 1}$$

FIND CRITICAL
POINTS

PLACES OF
INCREASING /
DECREASING

PLOT

EX. 4

$$f(x) = x^4 - 8x^2$$

FIND CRITICAL
POINTS

INC/decreasing

PLOT

EX. 5

FIND 'a' SO THAT $ax^2 - 4x - 2$

has a maximum value when $x = 2$

$$f(x) = ax^2 - 4x - 2$$

$$f'(x) =$$

SERIES AND SUMMATION

EX. 6

$$\sum_{k=1}^5 \{2k+1\}$$

k	1	2	3	4	5	Σ

EX. 7

$$\sum_{k=1}^4 \{2k\}$$

k	1	2	3	4	Σ

EX. 6

$$\sum_{i=1}^5 \{i-1\}$$

k	1	2	3	4	5	Σ

* note: this "i" represents any variable, not an imaginary "i".

LESSON PRACTICE

15A

Determine the intervals on which the function is increasing or decreasing and find all local maximums and minimums.

1. $f(x) = x^3 - 3x^2 + 1$

2. $f(x) = \frac{1}{3-x}$

3. $f(x) = x^2 - 4x + 2$

4. $f(x) = 2x^2e^x$

LESSON PRACTICE 15A

5. $f(x) = x^4 - 2x^3$

6. $f(x) = \frac{2}{2+x^2}$

7. Find any maximum and minimum values of $f(x) = -2x^3 - 3x^2 + 12x + 10$. Describe the intervals where the function is increasing or decreasing. Sketch the graph.