

Notes

Lesson 4

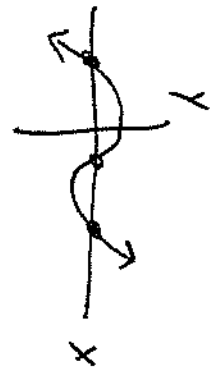
PreCalculus

Sec. 1.3

Increasing, Decreasing, & Constant

• Where does $f(x) = 0$: list the x-intercept(s).

$y = 0$ Zeros(s)



• **Increasing part:** state the x-values where the graph rises from left to right. (excluding the endpoints...never use brackets)

• **Decreasing part:** state the x-values where the graph falls from left to right. (excluding the endpoints...never use brackets)

• **Constant part:** state the x-values where the graph stays a horizontal line. (excluding the endpoints...never use brackets)

x 's only domain

$\mathbb{R} \rightarrow \mathbb{R}$

• **USE OPEN INTERVALS ONLY!!!**

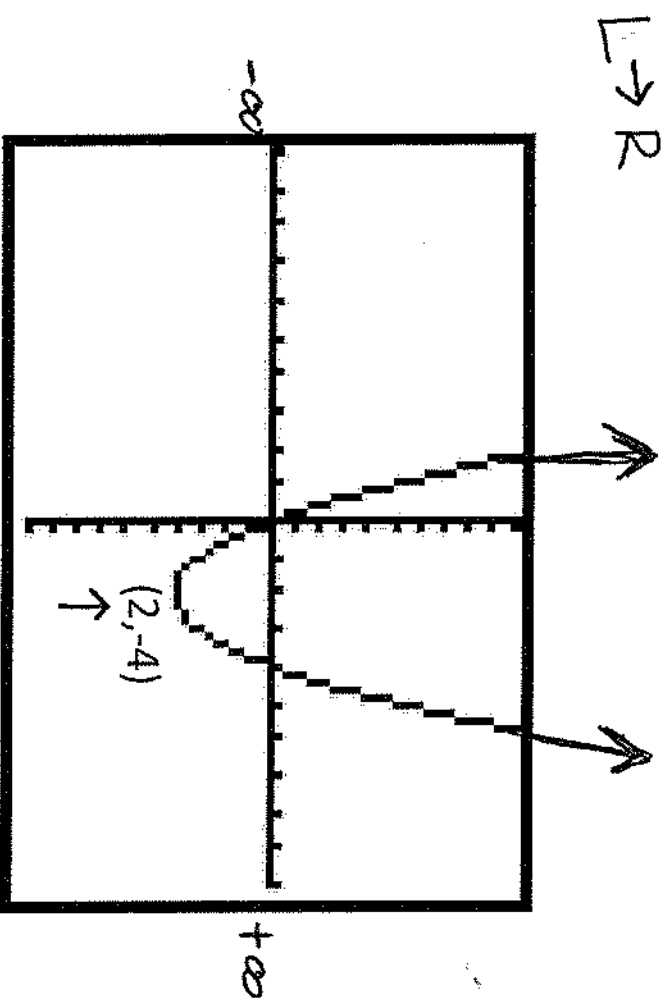
only use () ! ! !

Use the Graph to find the following:

domain (X's)

Decreasing: $(-\infty, 2)$

Increasing: $(2, \infty)$



Use a graphing utility to graph the function and determine the intervals on which the function is

increasing, decreasing, and constant.

$$f(x) = -|x+4| - |x+1|$$

negative
(front)

subtraction
(btwn)

absolute value

math

NUM

- 1) abs(
- 5) int(

1 - Box

6 - Standard

ZOOM

Model

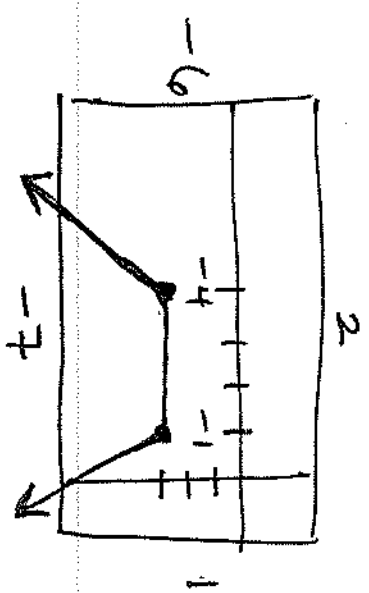
f-unc

$L \rightarrow R$

Increasing on: $(-\infty, -4)$

Constant on: $(-4, -1)$

Decreasing on: $(-1, \infty)$

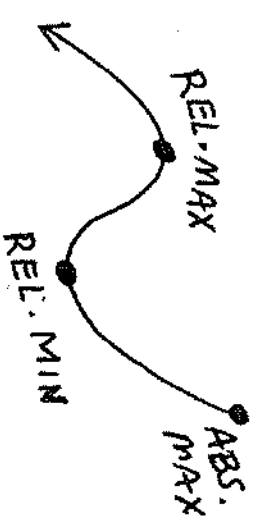


PreCalculus

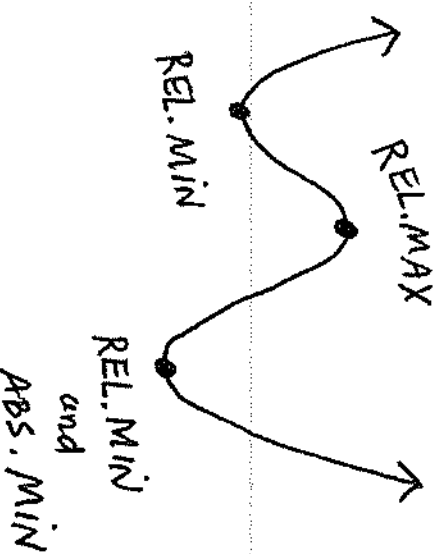
Sec. 1.3

Relative Max/Min

- **Relative Maximum or Minimum value:**
Usually expressed as an ordered pair: (x, y) .
For Rel. Maximum visualize: "Top" of a Mountain/hill
For Rel. Minimum visualize: "Bottom" of a Valley/or \cup
Relative max./min. **exclude** the endpoints of the graph.
Absolute max./min. may be an endpoint



- **Relative Maxima or Minima:** the relative max. or min. in plural form. A graph may have multiple relative maxima or minima.

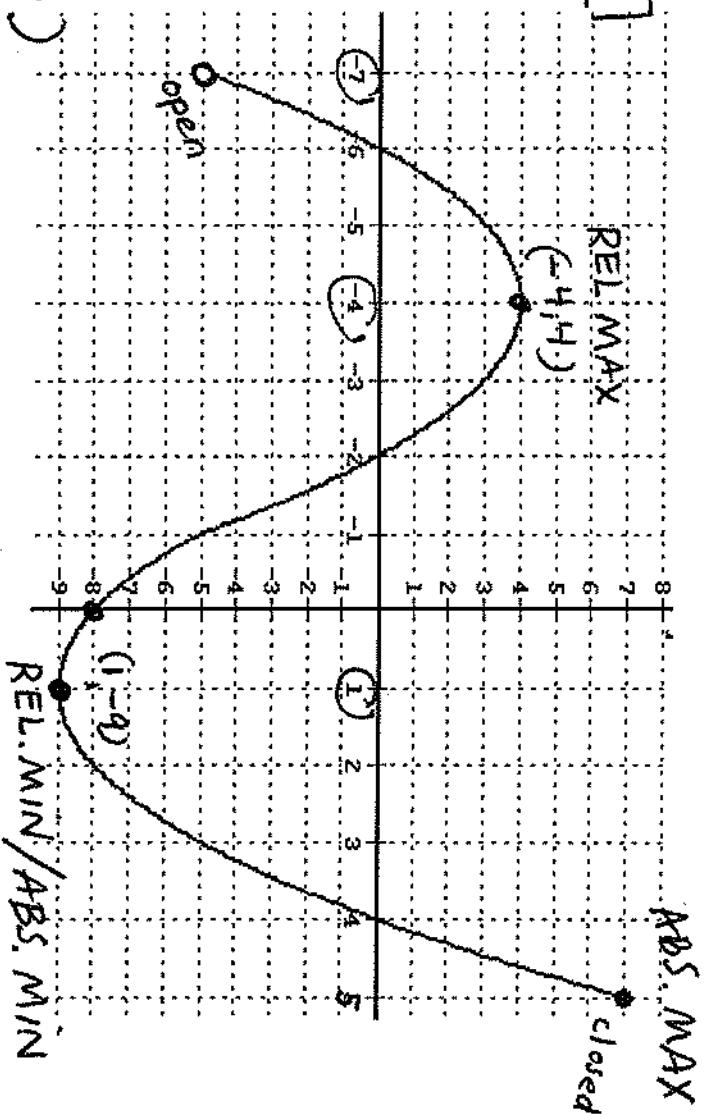


1. Find $f(0) = \boxed{-8}$

$\geq > < \leq$

2. What is the value of f at $x = 1$? $\boxed{-9}$
 What are the coordinates? $\boxed{(1, -9)}$

3. Where is $f(x) \geq 0$?



State the x - values, interval notation.

domain $\xrightarrow{L} \mathbb{R} \quad \boxed{[-6, -2]} \cup \text{or} \quad \boxed{[4, 5]}$

4. Relative Maximum value: $\boxed{4}$

Coordinates: $(-4, 4)$

5. Relative Minimum value: $\boxed{-9}$

Coordinates: $(1, -9)$

6. Where is the graph increasing?

State the x - values, interval notation.

$\boxed{(-7, -4)} \cup \boxed{(1, 5)}$

7. Where is the graph decreasing?

State the x - values, interval notation.

$\boxed{(-4, 1)}$

3b) Where is $f(x) \leq 0$

$\xrightarrow{\text{closed}}$

$\boxed{(-7, -6]} \cup \boxed{[-2, 4]}$



$$1.9377 \times 10^{-6}$$

$$h(x) = x^3 - 3x^2 + 10$$

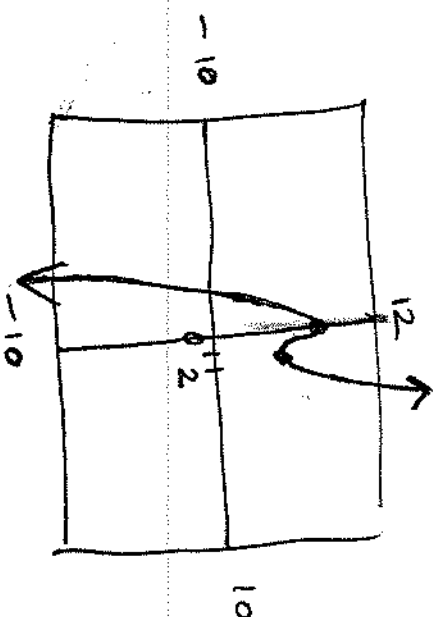
$$1.9377 \times 10^{-6}$$

Use a graphing utility to graph the function and find the following: (Round answers to nearest thousandth)

- 1) Relative maxima coordinates: $(0, 10)$
- 2) Relative minima coordinates: $(2, 6)$
- 3) Increasing $(-\infty, 0) \cup (2, \infty)$
- 4) Decreasing $(0, 2)$
- 5) Sketch the graph that appears in your window with the maxima and minima labeled.

scientific notation
 $(1.9377 \times 10^{-6}, 10)$

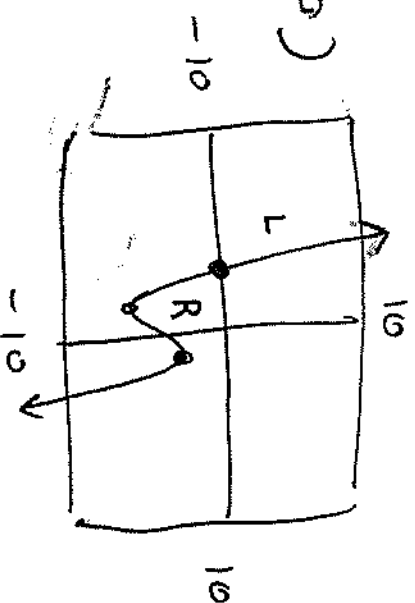
calculate \rightarrow 2nd Trace



$$g(x) = -x^3 + 2x - 5$$

Use a graphing utility to graph the function and find the following: (Round answers to nearest thousandth)

- 1) Relative maxima coordinates: $(0.816, -3.911)$
- 2) Relative minima coordinates: $(-0.816, -6.089)$
- 3) Increasing $(-0.816, 0.816)$
- 4) Decreasing $(-\infty, -0.816) \cup (0.816, \infty)$
- 5) Zero(s) $\boxed{X = -2.095}$
- 6) Where is $g(x) > 0$? $(-\infty, -2.095)$
↑
open

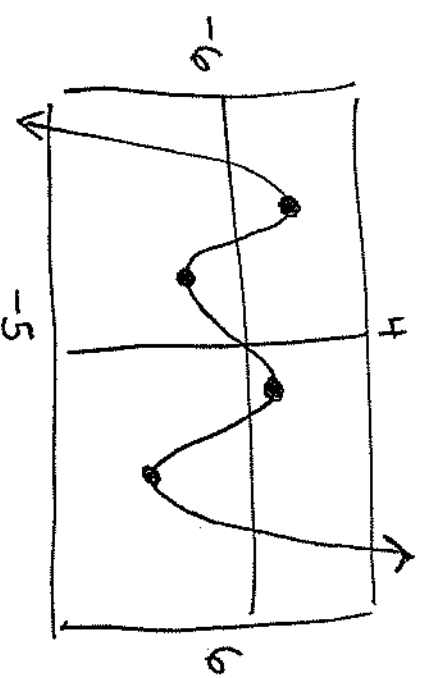


$\boxed{\text{Math}}$ \rightarrow $\boxed{\text{NUM}}$ \rightarrow n/d
 (last on list)

$$f(x) = \frac{1}{64}x^5 - \frac{1}{3}x^3 + x$$


Use a graphing utility to graph the function and find the following: (Round answers to nearest thousandth)

- 1) Relative maxima coordinates:
- 2) Relative minima coordinates:
- 3) Increasing
- 4) Decreasing
- 5) Sketch the graph that appears in your window with the maxima and minima labeled.



- 1) Rel Max : $(-3.421, 2.603); (1.046, 0.684)$
- 2) Rel Min : $(-1.046, -0.684); (3.421, -2.603)$
- 3) Incre : $(-\infty, -3.421) \cup (-1.046, 1.046) \cup (3.421, \infty)$
- 4) Decre : $(-3.421, -1.046) \cup (1.046, 3.421)$

To find a max or min:

1. Use the **2nd** key, followed by the **TRACE** (CALC)  key.
2. Choose 3: minimum **or** 4: maximum,
3. For *Left bound*, use the arrow to move the “blinking X” just to the left of the Minimum, **ENTER**.
4. Now repeat to the right for *Right bound*, **ENTER**.
5. Guess? **ENTER**