PreCalculus
Sec. 1.3
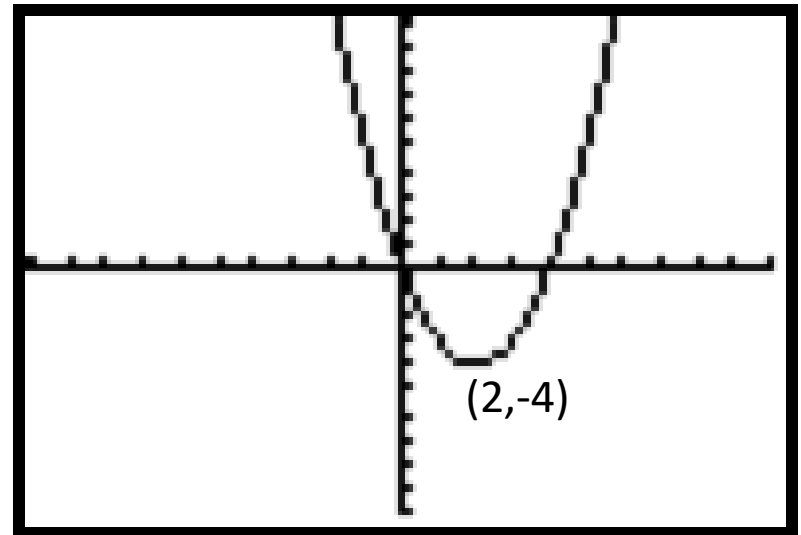# Increasing, Decreasing, & Constant

- **Where does *f(x)* = 0**: list the x-intercept(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)

- USE OPEN INTERVALS ONLY!!!

Use the Graph to find the following:

Decreasing:

Increasing:

(2,-4)

Use a graphing utility to graph the function and determine the intervals on which the function is increasing, decreasing, and constant.

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

Increasing on:

Constant on:

Decreasing on:

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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.
  For Rel. Minimum visualize: "Bottom" of a Valley.
  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).

2. What is the value of *f* at x = 1?
What are the coordinates?

3. Where is f (x) ≥ 0 ?
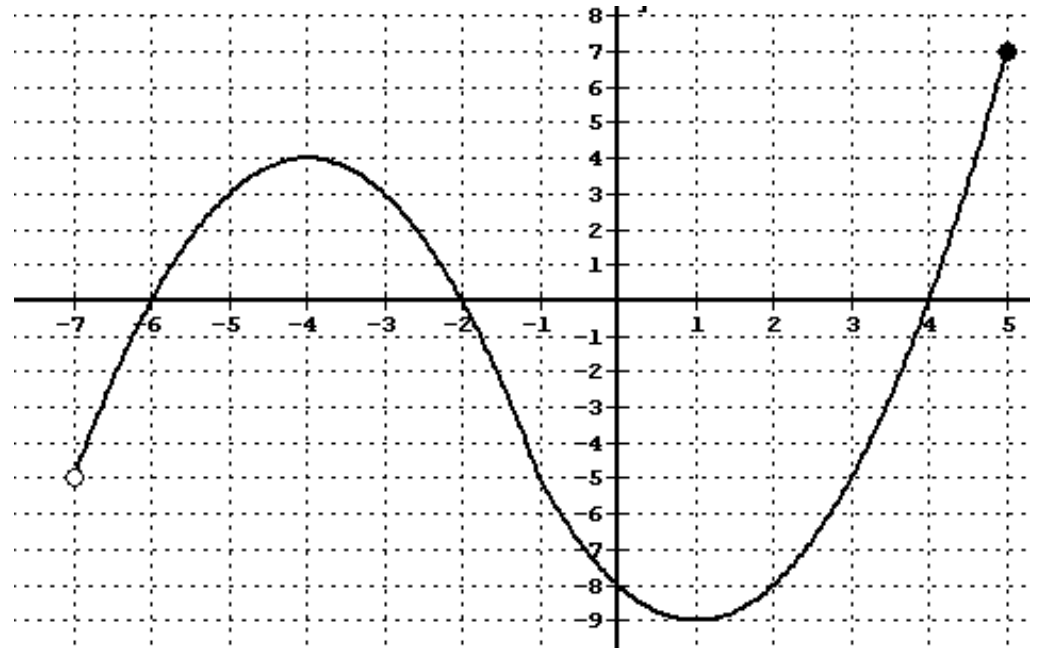State the x - values, interval notation.

4. Relative Maximum value :

5. Relative Minimum value :

6. Where is the graph increasing?
State the x - values, interval notation.

7. Where is the graph decreasing?
State the x - values, interval notation.

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

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.

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

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

1) Relative maxima coordinates:
2) Relative minima coordinates:
3) Increasing
4) Decreasing
5) Zero(s)
6) Where is g(x)>0?

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

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 : $\left(-3.421,\ 2.603\right); \left(1.046,\ 0.684\right)$

2) Rel Min : $\left(-1.046,\ -0.684\right); \left(3.421,\ -2.603\right)$

3) Incre : $\left(-\infty,\ -3.421\right) \cup \left(-1.046,\ 1.046\right) \cup \left(3.421,\ \infty\right)$

4) Decre : $\left(-3.421,\ -1.046\right) \cup \left(1.046,\ 3.421\right)$

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**