Section 2.3 Notes

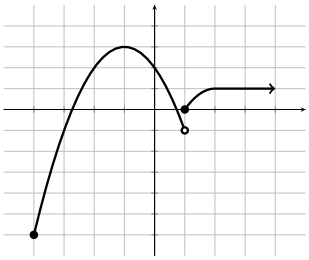
Getting Information from the Graph of a Function

Domain and Range

1. Domain: the set of all x-values/inputs
   - We need to write down (usually in interval notation) all of the x-values that show up on the graph.
   - Create a horizontal number line below the graph.
   - Fill in any points along this number line that have a corresponding point (same x-value) along the graph.
2. Range: the set of all y-values/outputs
   - We need to write down (usually in interval notation) all of the y-values that show up on the graph.
   - Create a vertical number line to the side of the graph.
   - Fill in any points along this number line that have a corresponding point (same y-value) along the graph.

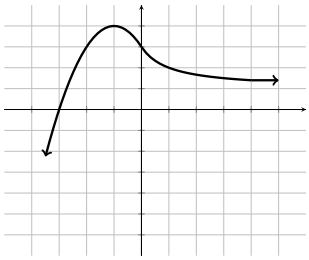
Examples

1.



Domain: $[-4, \infty)$
Range: $[-6, 3]$

2.

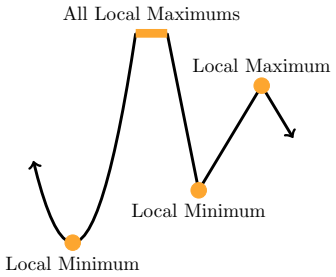


Domain: $(-\infty, \infty)$
Range: $(-\infty, 4]$

Local Maximums and Minimums

1. *Local maximums* are points that are higher than (or at equal height to) all nearby points on the graph.
2. *Local minimums* are points that are lower than (or at equal height to) all nearby points on the graph.

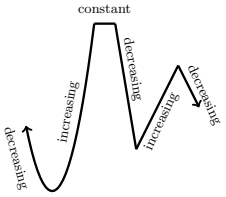
   For example:



Intervals of Increase and Decrease

1. A function is *increasing* when the graph goes *up* as you travel along it from left to right.
2. A function is *decreasing* when the graph goes *down* as you travel along it from left to right.
3. A function is *constant* when the graph is a perfectly flat horizontal line.

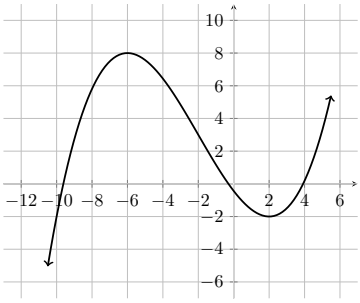
   For example:



The intervals of increase and decrease are *open* intervals written in terms of the x-values where the function is increasing or decreasing.

Examples

The graph of $g(x)$ is given. Evaluate $g(-6)$ and $g(-3)$. Then find all local maximums and minimums as well as the intervals of increase and decrease.



$g(-6) = 8$
$g(-3) = 5$
Local Maximums: 8 at $x = -6$.
Local Minimums: -2 at $x = 2$.
Intervals of Increase: $(-\infty, -6) \cup (2, \infty)$
Intervals of Decrease: $(-6, 2)$