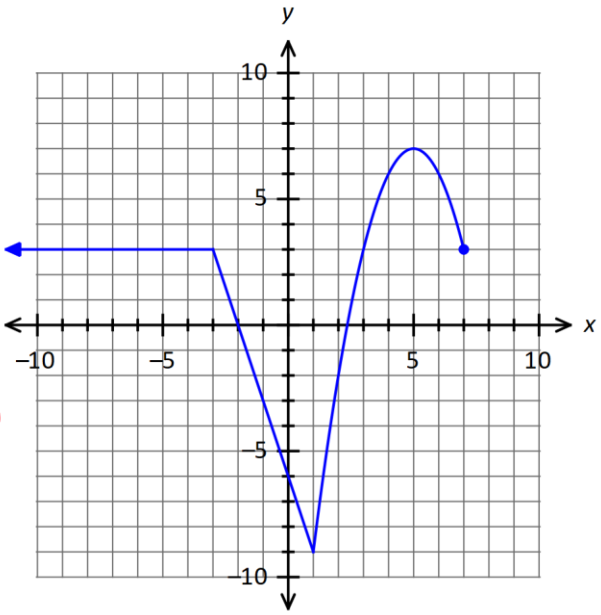
SM 3H

Date: 10/3/23 Section: 2.4

Objective: I can analyze key features of a graph.

Analyze the graph



Domain: $(-\infty, 7]$

Range: $[-9, 7]$

x-intercept(s): $(-2, 0)$ $(2.2, 0)$

y-intercept: $(0, -6)$

Relative or local maximum point(s): $(5, 7)$

Relative or local maximum value(s): $7, 3$

Relative or local minimum point(s): $(1, -9), (7, 3)$

Relative or local minimum value(s): $-9, 3$

Absolute maximum point(s): $(5, 7)$

Absolute maximum value(s): 7

Absolute minimum point(s): $(1, -9)$

Absolute minimum value(s): -9

Increase interval: $(1, 5)$

Decrease interval: $(-3, 1) \cup (5, 7)$

Constant interval: $(-\infty, -3)$

Positive interval: $(-\infty, -2) \cup (2.2, 7]$

Negative interval: $(-2, 2.2)$

Types of symmetry: odd / even

Symmetry: none

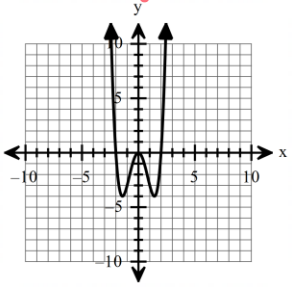
End behavior: $\lim_{x \to \infty} f(x) =$ DNE $\lim_{x \to -\infty} f(x) = 3$

Find symmetry algebraically

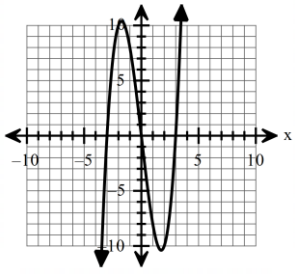
Even---$f(x) = f(-x)$

Odd---$-f(x) = f(-x)$

even



odd



Example:

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

$2(-x)^4 - 3(-x)^2 + 4$

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

even

$f(x) = -2x^7 - 5x^5 + 7x^3 + 2$

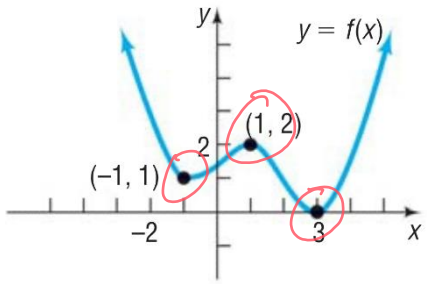
$-f(x) = 2x^7 + 5x^5 - 7x^3 - 2$

$f(-x) = 2(-x)^7 + 5(-x)^5 - 7(-x)^3 + 2$

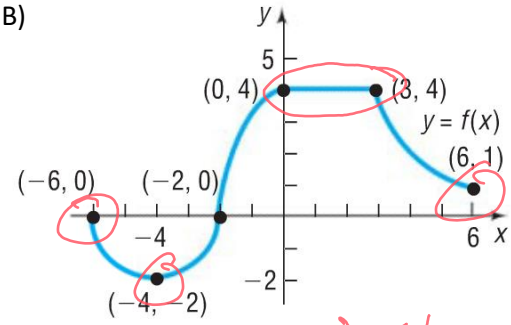
$-2x^7 - 5x^5 + 7x^3 + 2$

neither

A)



B)



a) At what number(s), if any, does f have a local maximum?

2

0, 4

b) What are the local maxima? (1, 2)

(−6, 0)

−2, 1

c) At what number(s), if any, does f have a local minimum?

0, 1

(−4, −2) (6, 1)

d) What are the local minima? (−1, 1) (3, 0)

e) List the intervals where f is increasing and the intervals where f is decreasing.

f) List the intervals where f is positive and the intervals where f is negative.

Find the Average Rate of Change of a Function

To find the average rate of change of a function between any two points on its graph, calculate the slope of the line containing the two points.

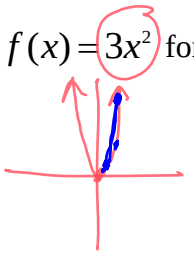
If a and b, $a \neq b$, are in the domain of a function $y = f(x)$, the **average rate of change of f** from a to b is defined as:

$$\text{Average rate of change} = \frac{\Delta y}{\Delta x} = \frac{f(b) - f(a)}{b - a} \quad a \neq b$$

The symbol Δy above is "the change in y," and Δx is the "change in x." The average rate of change of f is the change in y divided by the change in x.

Example:

Find the average rate of change of $f(x) = 3x^2$ for the following intervals:



a) From 1 to 3 or [1, 3]

b) From 1 to 5 or [1, 5]

$y = 3(1)^2 = 3$

$y = 3(3)^2 = 27$

(1, 3)

(3, 27)

$\frac{27-3}{3-1} = \frac{24}{2} = 12$

c) From 1 to 7 or [1, 7]

d)

Years	Cost
1	2
2	3
3	5
4	8
5	9

[2, 5]

$\frac{9-3}{5-2} = \frac{6}{3} = 2$