PreCalculus 1-2: ***Analyzing Graphs*** Name:_____

Objectives:

- Use graphs of functions to estimate function values and find domains, ranges, y-intercepts, and zeros of functions.
- Explore symmetries of graphs, and identify even and odd functions.

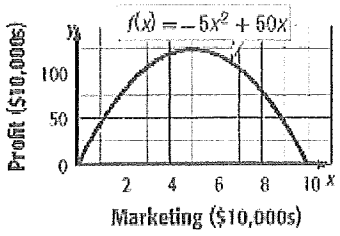
Common Core State Standards: A-REI.10, F-IF.5, F-IF.7b, F-IF.8

WS :

1. The linear graph of a function for net profit/loss given x units sold has an x-intercept of 200. What does this mean?

Ex. 1]

ADVERTISING The function $f(x) = -5x^2 + 50x$ approximates the profit at a toy company, where x is marketing costs and $f(x)$ is profit. Both costs and profits are measured in tens of thousands of dollars.

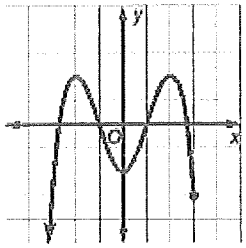


a. Use the graph to estimate the profit when marketing costs are \$30,000. Confirm your estimate algebraically.

b. Use the graph to estimate marketing costs when the profit is \$1,250,000. Confirm your estimate algebraically.

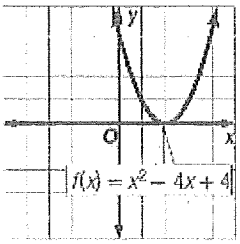
Ex. 2]

Use the graph of f to find the domain and range of the function.

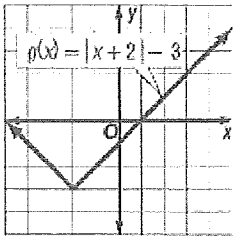


Ex. 3] Use the graph of each function to approximate its y-intercept. Then find the y-intercept algebraically.

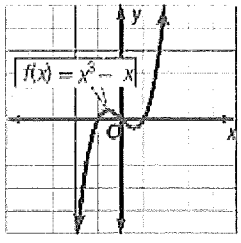
a.



b.

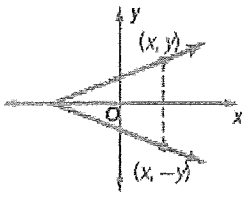
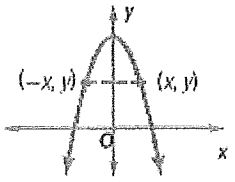
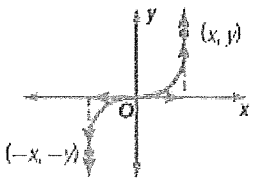


Ex. 4] Use the graph of $f(x) = x^3 - x$ to approximate its zeros. Then find its zeros algebraically.



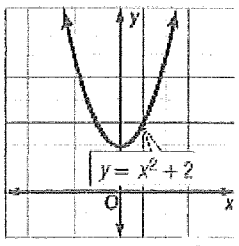
Tests For Symmetry:

KeyConcept Tests for Symmetry

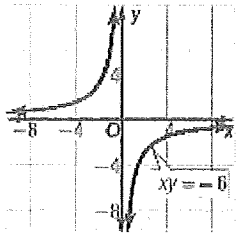
Graphical Test	Model	Algebraic Test
The graph of a relation is *symmetric with respect to the x-axis* if and only if for every point (x, y) on the graph, the point $(x, -y)$ is also on the graph.		Replacing y with $-y$ produces an equivalent equation.
The graph of a relation is *symmetric with respect to the y-axis* if and only if for every point (x, y) on the graph, the point $(-x, y)$ is also on the graph.		Replacing x with $-x$ produces an equivalent equation.
The graph of a relation is *symmetric with respect to the origin* if and only if for every point (x, y) on the graph, the point $(-x, -y)$ is also on the graph.		Replacing x with $-x$ and y with $-y$ produces an equivalent equation.

Ex. 5] Use the graph of each equation to test for symmetry with respect to the x-axis, the y-axis, and the origin. Support the answer numerically. Then confirm algebraically.

a.



b.



Even vs. Odd functions:

KeyConcept Even and Odd Functions

Type of Function	Algebraic Test
Functions that are symmetric with respect to the y-axis are called even functions.	For every x in the domain of f, $f(-x) = f(x)$.
Functions that are symmetric with respect to the origin are called odd functions.	For every x in the domain of f, $f(-x) = -f(x)$.

Can You Draw It?

a. **An even degree function that IS an even function.**

b. **An even degree function that is NOT an even function.**

c. **An odd degree function that IS an odd function.**

d. **An odd degree function that IS NOT an odd function.**

Ex. 6] Graph each function using a GC. Anlyze the graph to determine whether each function is even, odd or neither. Confirm algebraically & numerically. Describe all symmetries.

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

b. $f(x) = x^2 - 4$

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

1-2 Homework: P. 19-22 #3, 6-8, 9-51 (X3).