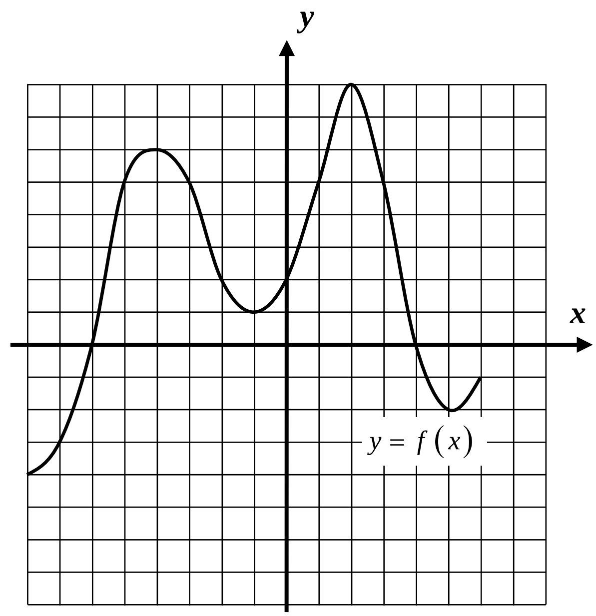
Name: ____________________________________ Date: __________________

KEY FEATURES OF FUNCTIONS
COMMON CORE ALGEBRA II

The graphs of functions have many key features whose terminology we will be using all year. It is important to master this terminology, most of which you learned in Common Core Algebra I.

***Exercise* #1:** The function $y = f(x)$ is shown graphed to the right. Answer the following questions based on this graph.



(a) State the y-intercept of the function.

(b) State the x-intercepts of the function. What is the alternative name that we give the x-intercepts?

(c) Over the interval $-1 < x < 2$ is $f(x)$ increasing or decreasing? How can you tell?

(d) Give the interval over which $f(x) > 0$. What is a quick way of seeing this visually?

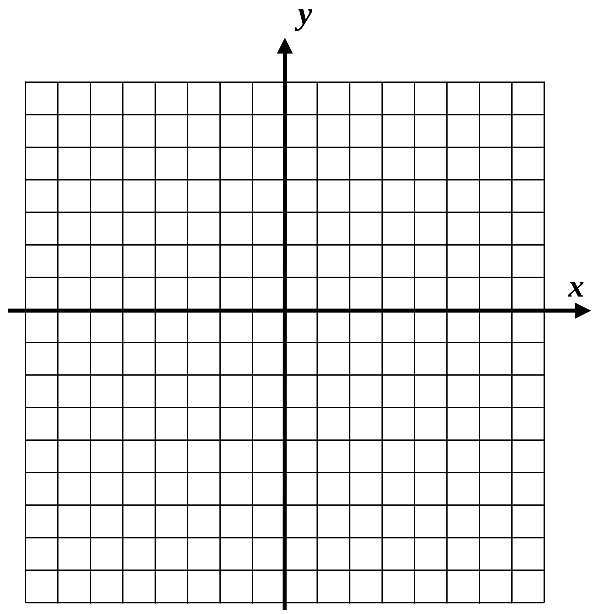
(e) State all the x-coordinates of the relative maximums and relative minimums. Label each.

(f) What are the absolute maximum and minimum values of the function? Where do they occur?

(g) State the domain and range of $f(x)$ using interval notation.

(h) If a second function $g(x)$ is defined by the formula $g(x) = \frac{1}{2} f(x+2)$, then what is the y-intercept of g?

***Exercise* #2:** Consider the function $g(x)=2|x-1|-8$ defined over the domain $-4 \le x \le 7$.



(a) Sketch a graph of the function to the right.

(b) State the domain interval over which this function is decreasing.

(c) State zeroes of the function on this interval.

(d) State the interval over which $g(x) \le 0$

(e) Evaluate $g(0)$ by using the algebraic definition of the function. What point does this correspond to on the graph?

(f) Are there any relative maximums or minimums on the graph? If so, which and what are their coordinates?

You need to be able to think about functions in all of their forms, including equations, graphs, and tables. Tables can be quick to use, but sometimes hard to understand.

***Exercise* #3:** A **continuous** function $f(x)$ has a domain of $-6 \le x \le 13$ with selected values shown below. The function has exactly two zeroes and has exactly two turning points, one at $(3,-4)$ and one at $(9,3)$.

x	-6	-1	0	3	5	8	9	13
$f(x)$	5	0	-2	-4	-1	0	3	1

(a) State the interval over which $f(x)<0$.

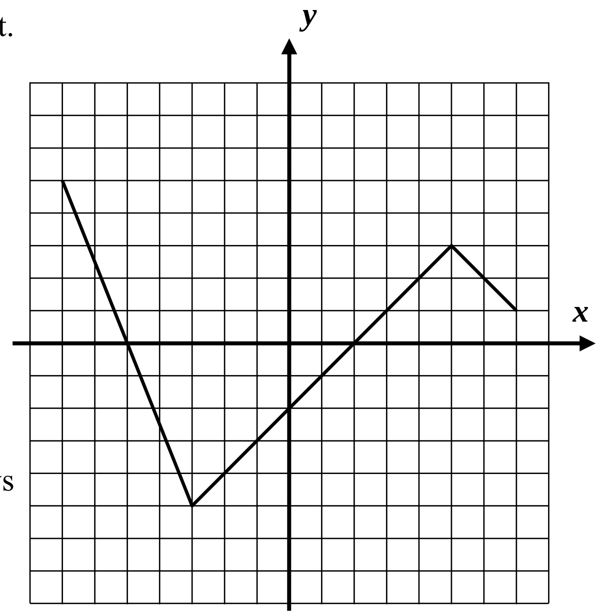
(b) State the interval over which $f(x)$ is increasing.

Name: ____________________________________ Date: __________________

KEY FEATURES OF FUNCTIONS
COMMON CORE ALGEBRA II HOMEWORK

FLUENCY

1. The piecewise linear function $f(x)$ is shown to the right. Answer the following questions based on its graph.



(a) Evaluate each of the following based on the graph:

(i) $f(4)=$ (ii) $f(-3)=$

(b) State the zeroes of $f(x)$.

(c) Over which of the following intervals is $f(x)$ always increasing?

(1) $-7<x<-3$ (3) $-5<x<5$

(2) $-3<x<5$ (4) $-5<x<3$

(d) State the coordinates of the relative maximum and the relative minimum of this function.

Relative Maximum:________________

Relative Minimum:________________

(e) Over which of the following intervals is $f(x)<0$?

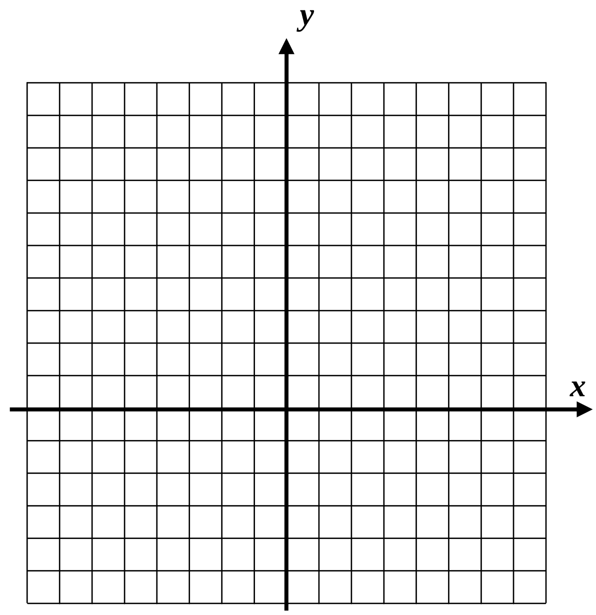
(1) $-7<x<-3$ (3) $-5<x<2$

(2) $2\le x\le 7$ (4) $-5\le x\le 2$

(f) A second function $g(x)$ is defined using the rule $g(x)=2f(x)+5$. Evaluate $g(0)$ using this rule. What does this correspond to on the graph of g?

(g) A third function $h(x)$ is defined by the formula $h(x)=x^3-3$. What is the value of $g(h(2))$? Show how you arrived at your answer.

2. For the function $g(x) = 9 - (x+1)^2$ do the following.



(a) Sketch the graph of g on the axes provided.

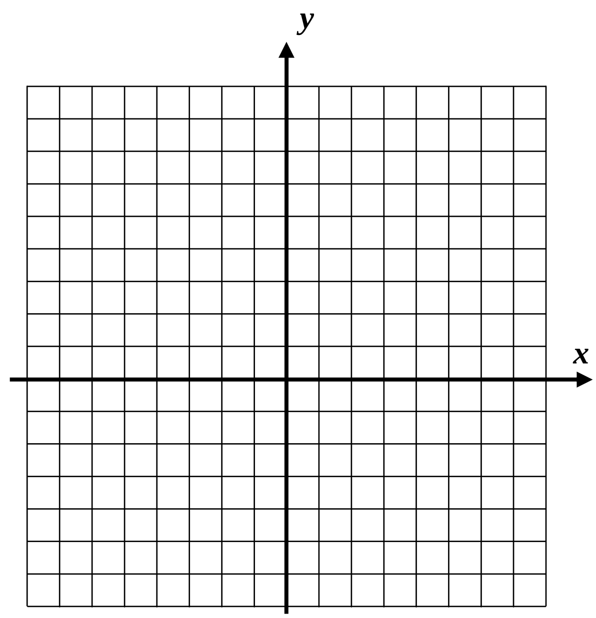
(b) State the zeroes of g.

(c) Over what interval is $g(x)$ decreasing?

(d) Over what interval is $g(x) \geq 0$?

(e) State the range of g.

3. Draw a graph of $y = f(x)$ that matches the following characteristics.



Increasing on: $-8 < x < -4$ and $-1 < x < 5$

Decreasing on: $-4 < x < -1$

$f(-8) = -5$ and zeroes at $x = -6, -2,$ and 3

Absolute maximum of 7 and absolute minimum of -5

4. A continuous function has a domain of $-7 \leq x \leq 10$ and has selected values shown in the table below. The function has exactly two zeroes and a relative maximum at $(-4, 12)$ and a relative minimum at $(5, -6)$.

x	-7	-4	-1	0	2	5	7	10
$f(x)$	8	12	0	-2	-5	-6	0	4

(a) State the interval on which $f(x)$ is decreasing.

(b) State the interval over which $f(x) < 0$.