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Math 48A, Exam 2
Lessons 4, 5, 6, 7, and 8

1. IDENTIFY LINEAR FUNCTIONS USING EQUATIONS

Which of the following equations represent linear functions?

a. $3y = 5x - 2$ ______ linear function ______ not a linear function

b. $y = x^2 - 7$ ______ linear function ______ not a linear function

c. $y = \frac{2}{x} - 5$ ______ linear function ______ not a linear function

d. $y^2 = 4x - 7$ ______ linear function ______ not a linear function

2. IDENTIFY LINEAR FUNCTIONS USING A TABLE

Below are tables for two different functions. One of these tables has points from a linear function, and the other does not.

x	$f(x)$
- 8	2
- 4	4
-1	6
1	8
2	10

x	$g(x)$
- 6	14
- 4	10
- 1	4
1	0
2	-2

2A. Which function is linear? Explain your reasoning.

2B. Write an equation for the linear function. Justify your answer.

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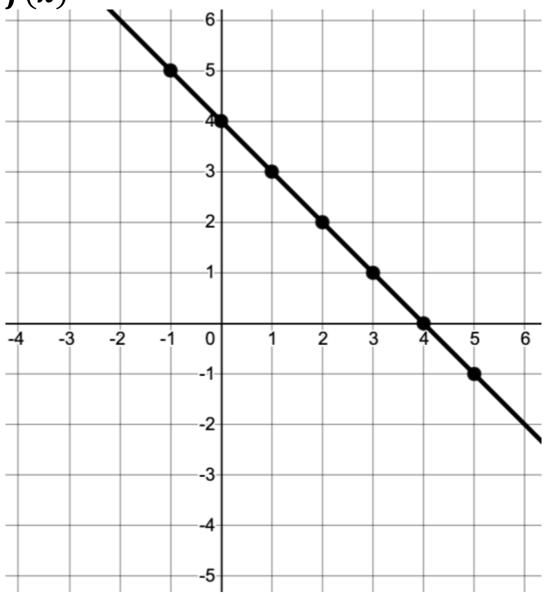
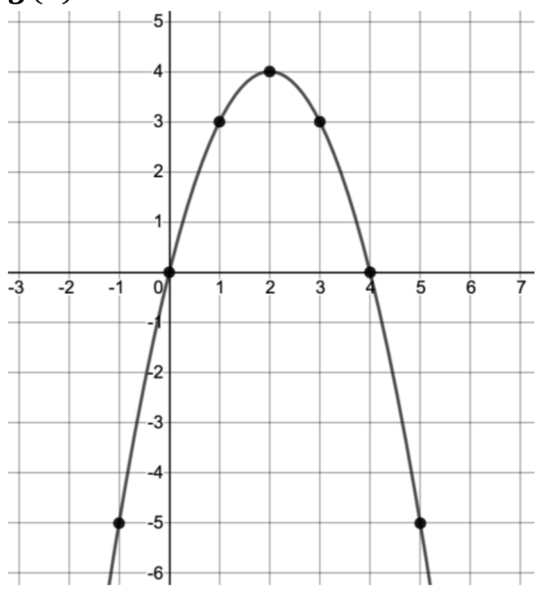
3. EVALUATE FUNCTIONS USING GRAPHS

Below are graphs of functions $f(x)$ and $g(x)$.

$\boldsymbol{f(x)}$



$\boldsymbol{g(x)}$



Use the graphs above to evaluate each of the following:

$f(-1)$

$g(2)$

Challenge Problems: Use the graphs to evaluate each of the following:

$f(g(0))$

$g(f(5))$

4. SOLVE ABSOLUTE VALUE EQUATIONS ALGEBRAICALLY

Consider the following absolute value equation:

$$|2x - 4| - 5 = 1$$

Solve this equation using an algebraic method (not graphically). Hint: you might check your work by solving problem 5A below and looking back at this problem.

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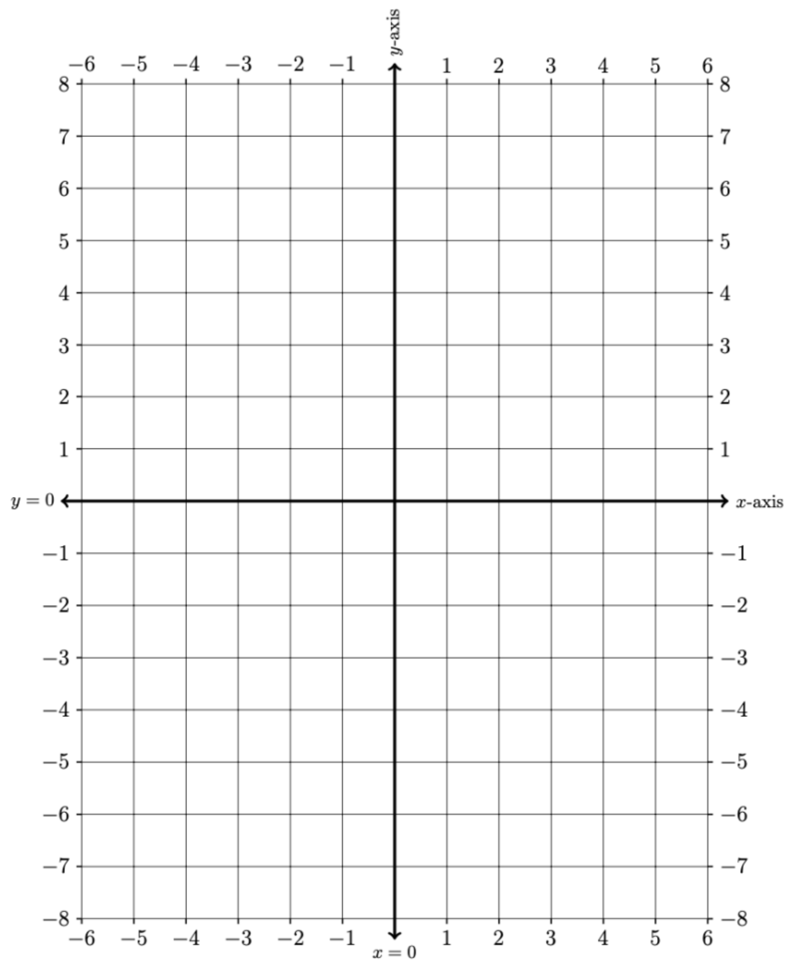
5. SOLVE ABSOLUTE VALUE EQUATIONS GRAPHICALLY

5A. Consider the following absolute value equation:

$$|2x - 4| - 5 \;=\; 1$$

Use the left-hand side (LHS) and right-hand side (RHS) of this equation to a table of values and draw the resulting graph on the axes below. Then, solve this equation using the information in your graph.



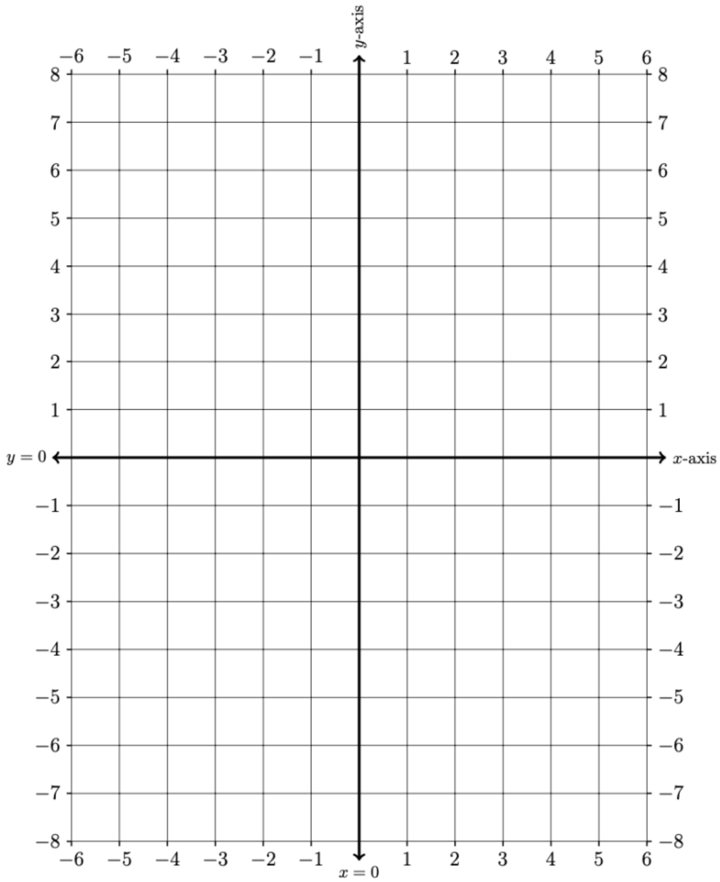
x	LHS	RHS
-6		
-5		
-4		
-3		

-2		
-1		
0		
$\frac{4}{5}$		
1		
2		
3		
4		
5		
6		

5B. Redraw your graph from problem 5A in the axes below. Then consider the absolute value inequality:

$$|2x - 4| - 5 \;\; \geq \;\; 1$$

Using your graph, identify all x-values that solve this equation.


y-axis
x-axis
$y = 0$
$x = 0$
−6 −5 −4 −3 −2 −1 1 2 3 4 5 6
8 7 6 5 4 3 2 1 −1 −2 −3 −4 −5 −6 −7 −8

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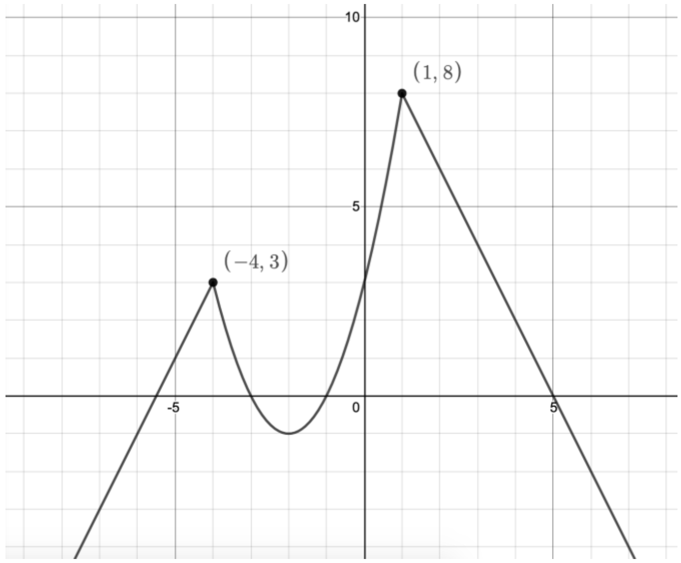
6. ANALYZE THE GRAPH OF A FUNCTION

Below is a graph of a function $f(x)$.



Use the graph to answer each of the following questions about the function f. For some of your answers you may need to approximate the value. Please give a decimal approximation using your best judgment based on the graph.

6A. What is $f(-5)$?

6B. What is $f(0)$?

6C. Find the x values for which $f(x) = 0$.

6D. Find the x values for which $f(x) \leq 3$.

6E. Find the x values for which $f(x) > 9$

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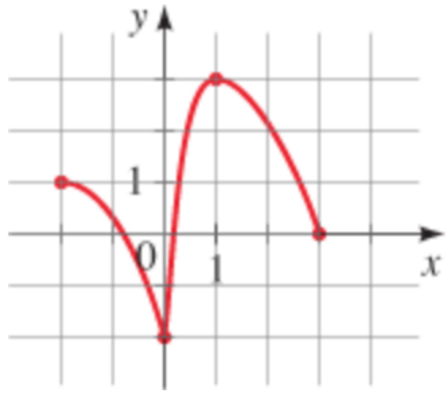
7. ANALYZE THE GRAPH OF A FUNCTION

Below is a graph of a function $k(x)$. Use the graph to answer the questions about the function.



7A. At what point(s) does $k(x)$ have a local maximum?

7B. On what interval(s) is $k(x)$ decreasing.

7C. Find the average rate of change of $k(x)$ from $x = 0$ to $x = 3$.

8. EVALUATE FUNCTIONS

For all problems below, let $f(x) = x^2 - x + 3$.

8A. Evaluate $f(3)$

8B. Evaluate $f(-5)$

8C. If $f(x) = x^2 - x + 3$, then evaluate $f(2a)$

8D. If $f(x) = x^2 - x + 3$, then evaluate $f(a + h)$

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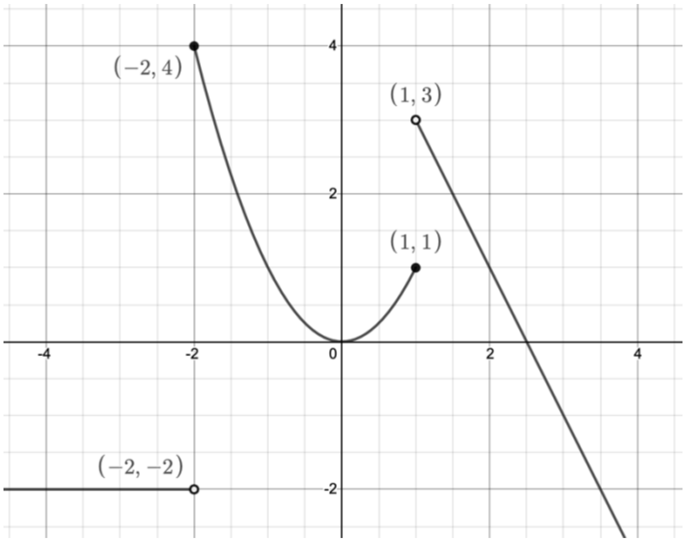
9. FIND PIECEWISE FUNCTIONS (CHALLENGE PROBLEM)

The following is a graph of a piecewise defined function $g(x)$. Find the formula (rule) for each part of the function and the x-values for which it applies. Explain your reasoning.



$$g(x) = \begin{cases} & \text{if} \\ & \text{if} \\ & \text{if} \end{cases}$$