Algebra 1 Workbook

Functions and graphing

krista king MATH

CARTESIAN COORDINATE SYSTEM

1. Graph the point $(-2,3)$ in the Cartesian plane.

2. In which quadrant should we plot the point $(1,6)$?

3. What is the y-coordinate of any point that lies on the x-axis? Give an example of a coordinate point that lies on the x-axis.

4. Graph the point $(-1,-5)$ in the Cartesian plane.

5. In which quadrant should we plot $(3,-7)$?

6. What is the x-coordinate of any point that lies on the y-axis? Give an example of a coordinate point that lies on the y-axis.

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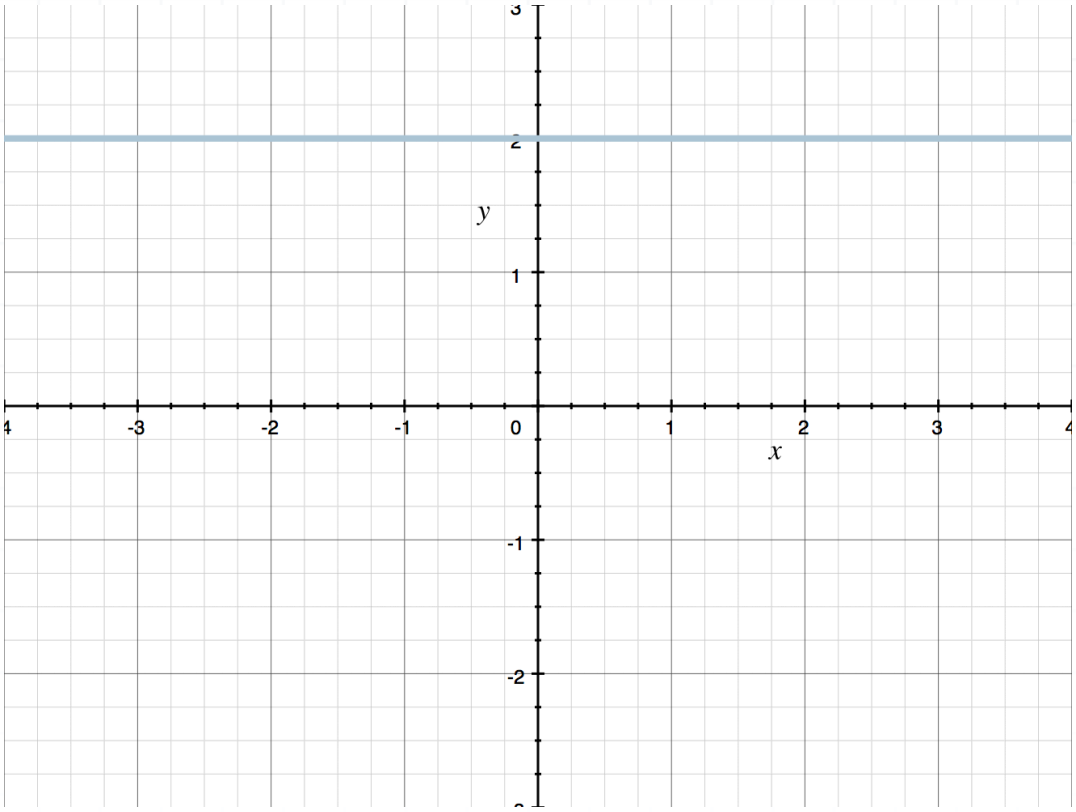
SLOPE

1. What is the slope of the line?



2. What direction is an undefined slope: horizontal or vertical? Use the formula for the slope to explain why.

3. What is the slope of the line?

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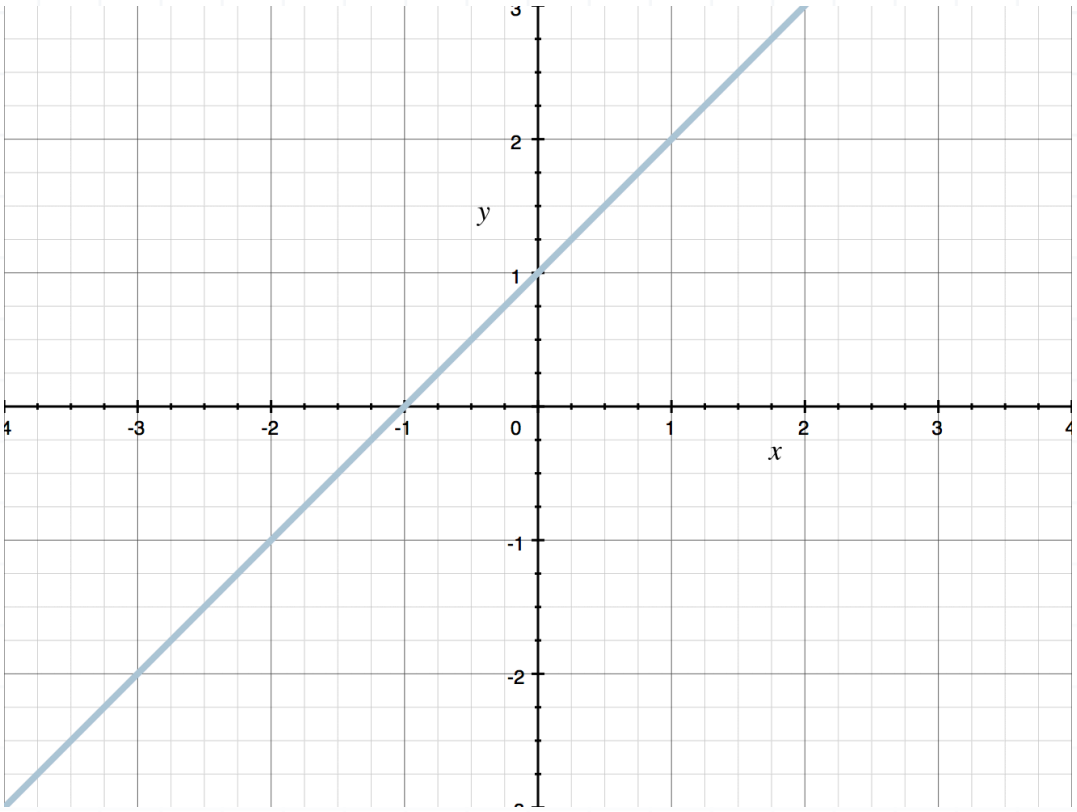
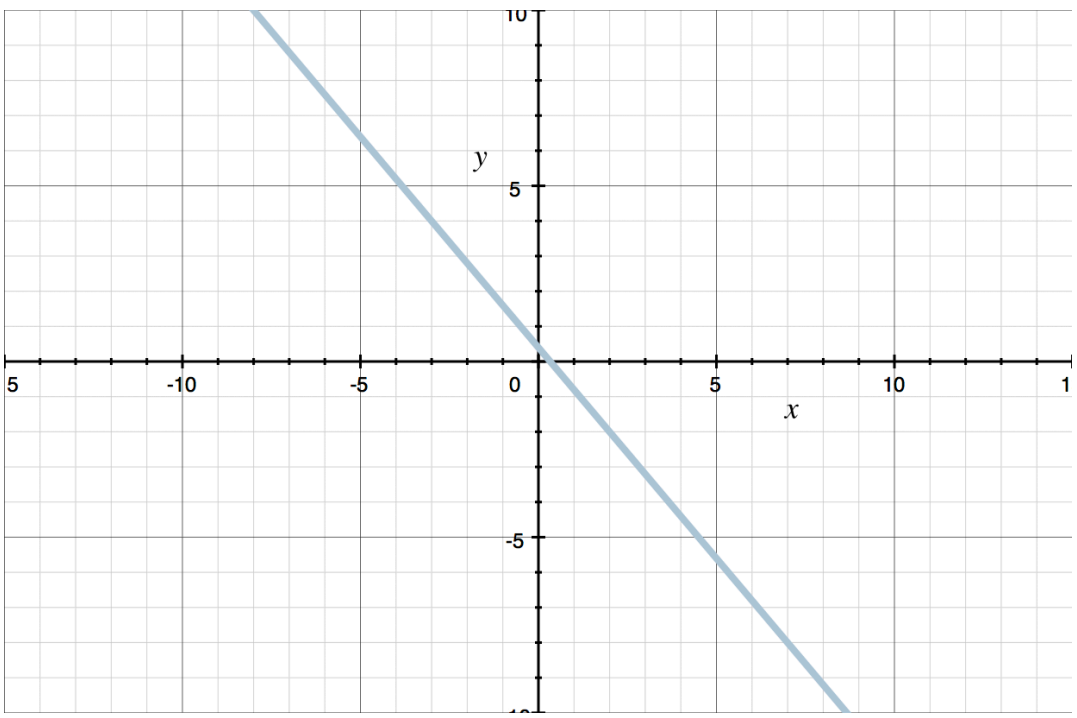


4. What is the slope of the line that passes through the points $(-1,3)$ and $(4,-7)$?

5. What is the slope of the line?



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6. Find the slope of the line that passes through $(3,5)$ and $(-1,5)$.

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POINT-SLOPE AND SLOPE-INTERCEPT FORMS OF A LINE

1. Find the equation of the line that passes through $(3,0)$ with slope -2.

2. Find the equation of the line that passes through the points $(-2,3)$ and $(2,-4)$.

3. Find the equation of the line that passes through the points $(5,-4)$ and $(6,0)$.

4. Identify the y-intercept and slope m defining the line.

$$y = -\frac{1}{4}(x + 12)$$

5. Convert the point-slope equation into a slope-intercept equation.

$$y - 3 = \frac{1}{3}(x - 6)$$

6. Find the equation of a line that passes through the points $(1,-1)$ and $(0,3)$. Write the solution in slope-intercept form.

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GRAPHING LINEAR EQUATIONS

1. Graph the line.

$$y = \frac{4}{3}x - 1$$

2. Describe how we would use the slope to find another point on the line if the slope is $m = 2/3$ and the line passes through $(x_1, y_1) = (-1,2)$.

3. Graph the line.

$$y + 2 = -3x + 1$$

4. Use the slope $m = 1/3$ to find two more points on the line passing through $(1,2)$. Move right to determine one point and left to determine another.

5. Graph the line.

$$y = -2(3x + 1)$$

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6. Give two points that lie on the line, find the slope, and graph the line.

$$y + 3 = -\frac{1}{2}(4x + 10)$$

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FUNCTION NOTATION

1. Find and simplify $f(x+1)$ if $f(x) = 4x - 5$.

2. What went wrong in this set of steps?

Evaluate $f(x) = x^2 + 1$ at $x = -2$.

$$f(-2) = -2^2 + 1$$

$$f(-2) = -4 + 1$$

$$f(-2) = -3$$

3. Find and simplify $h(s^2)$ if $h(s) = -s^2 + 3s - 1$.

4. If $g(x) = x^3 - x + 1$, what do we need to plug into the function in order to get the following expression?

$$g(??) = (2x+1)^3 - (2x+1) + 1$$

5. Find the value of the expression if $f(x) = x^2 + x - 1$.

$$\frac{f(x+h) - f(x)}{h}$$

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6. What went wrong in this set of steps?

Find $f(1)$ if $f(x) = x^3 + 3x^2 - 5x + 2$.

$$f(1) = 1^3 + 3(1)^2 - 5(1) + 2$$

$$f(1) = 1 + 9 - 5 + 2$$

$$f(1) = 7$$

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DOMAIN AND RANGE

1. Find the domain of $f(x)$.

$$f(x) = \frac{3}{x(x+1)} + x^2$$

2. Find the domain and range of the point set.

$$(-1,-3), \quad (0,5), \quad (-3,6), \quad (0,-3)$$

3. Find the domain and range of $g(x)$.

$$g(x) = \frac{\sqrt{x-2}}{3}$$

4. Find the domain and range of the function.

$$f(x) = \frac{2}{x} + 1$$

5. Find the domain and range of $g(x)$.

$$g(x) = -x^2 + 5$$

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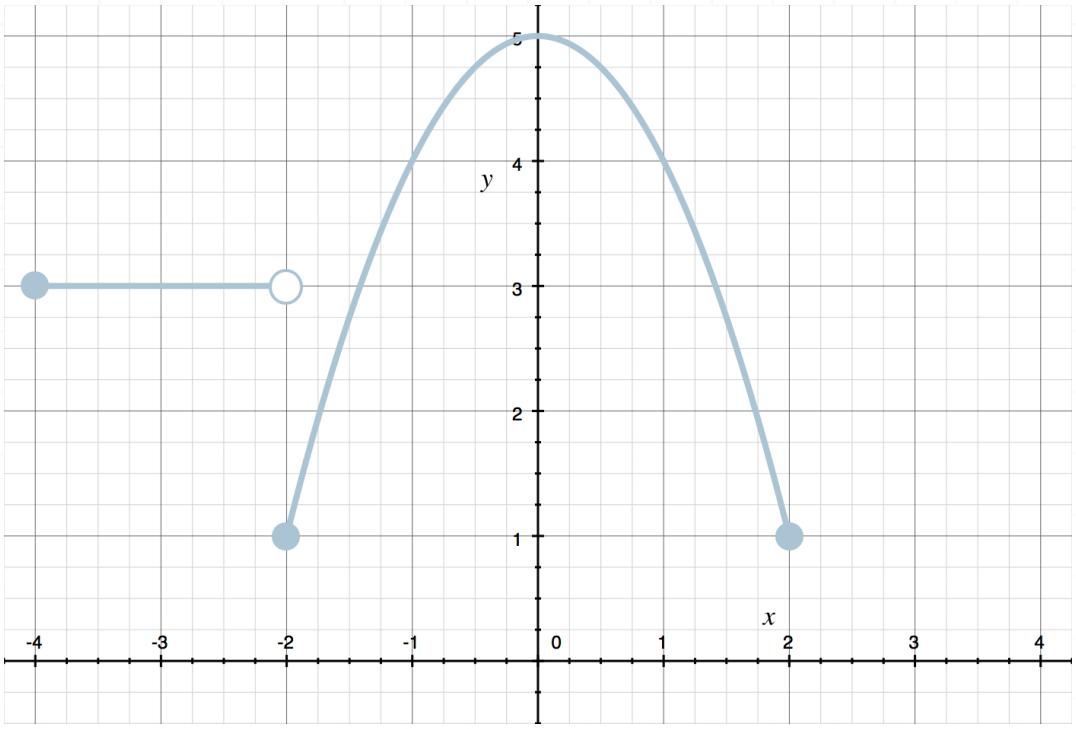
6. What is the domain and range of the graph? Hint: An empty circle indicates that exact point *is not* included as part of the graph, while a solid circle indicates that exact point *is* included as part of the graph.



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TESTING FOR FUNCTIONS

1. Determine whether or not the point set represents a function.

$(2, -1), (-1,0), (0, -1), (3,2)$

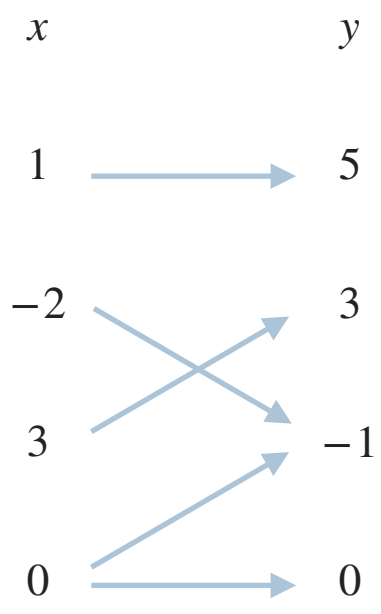
2. Fill in the blanks in the definition of a function.

For every _____, there is only one unique _____.

3. Determine whether or not the point set represents a function.

$(1,2), (-1,5), (1, -3), (0,1)$

4. Determine whether the mapping represents a function.



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5. Determine algebraically whether or not the equation represents a function.

$$(x-1)^2+y=3$$

6. Determine algebraically whether or not the equation represents a function.

$$y^2=x+1$$

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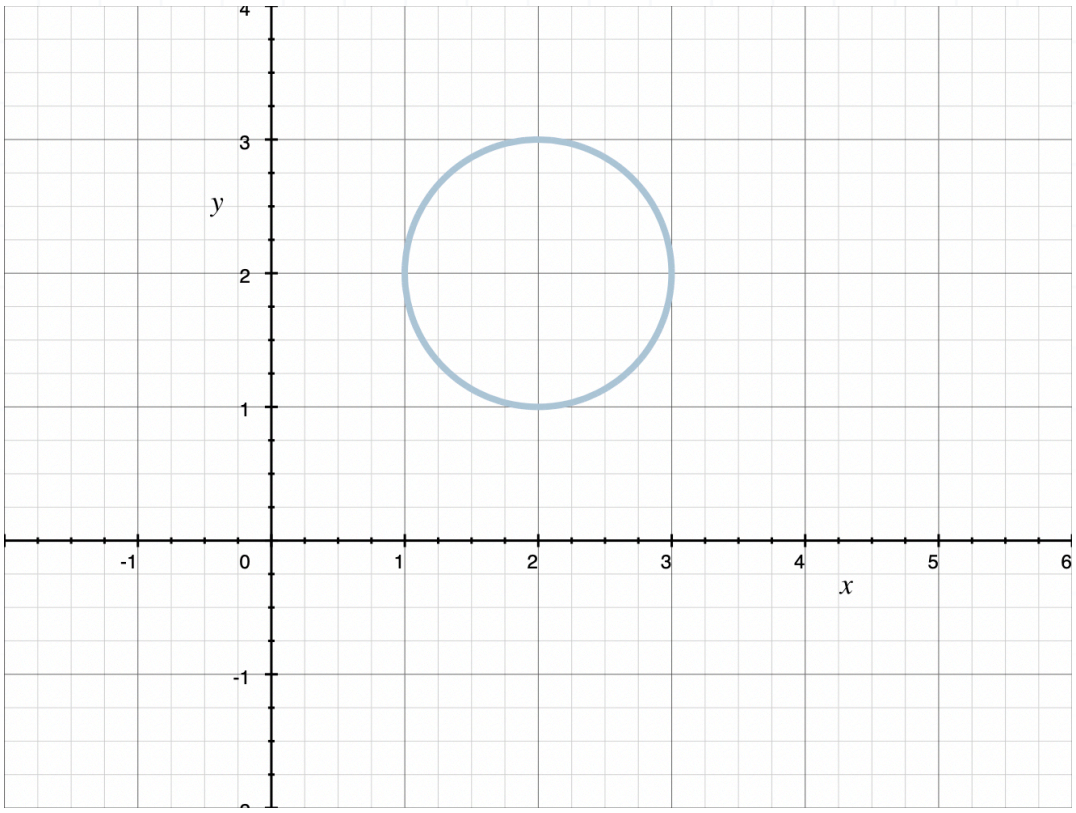
VERTICAL LINE TEST

1. Use the Vertical Line Test to determine whether or not the graph is the graph of a function.



2. Use the Vertical Line Test to determine whether or not the graph represents a function. Hint: an empty circle indicates that exact point isn't included in the graph, where a solid circle indicates that exact point is included in the graph.

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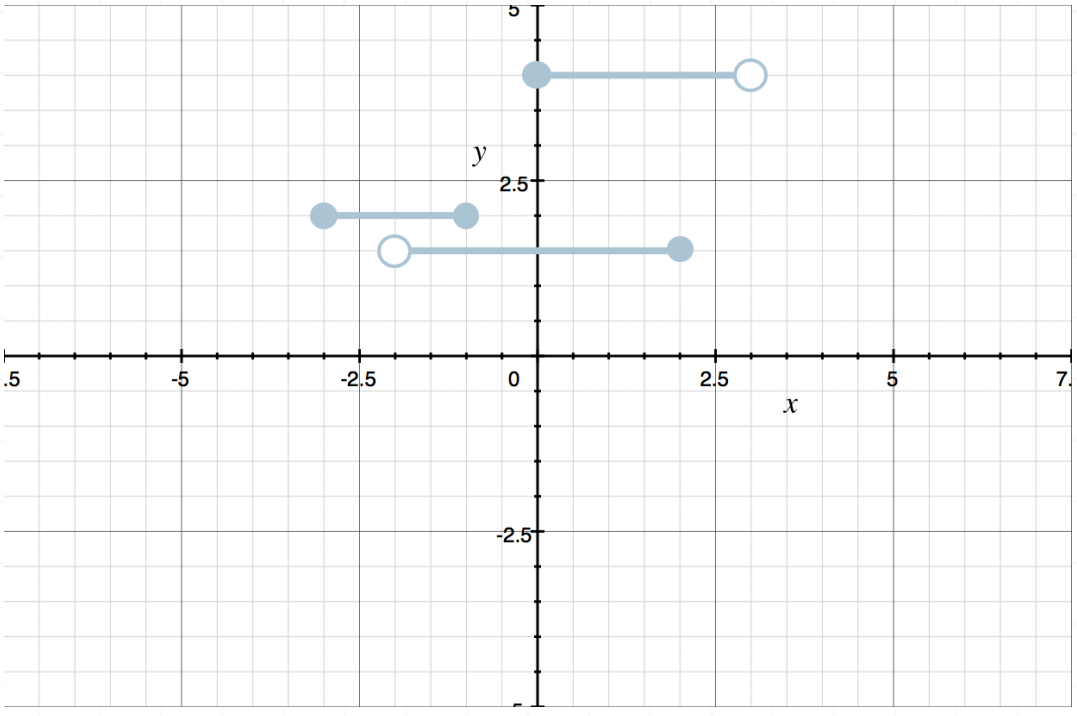

3. Explain why the Vertical Line Test can determine whether or not a graph represents a function.

4. Fill in the blanks using the words “equations” and “functions.”

Not all _____ are _____.

5. Draw a graph that represents a function, and explain why it’s a function.

6. Determine whether or not the graph represents a function. Hint: an empty circle indicates that exact point isn’t included in the graph, where a solid circle indicates that exact point is included in the graph.

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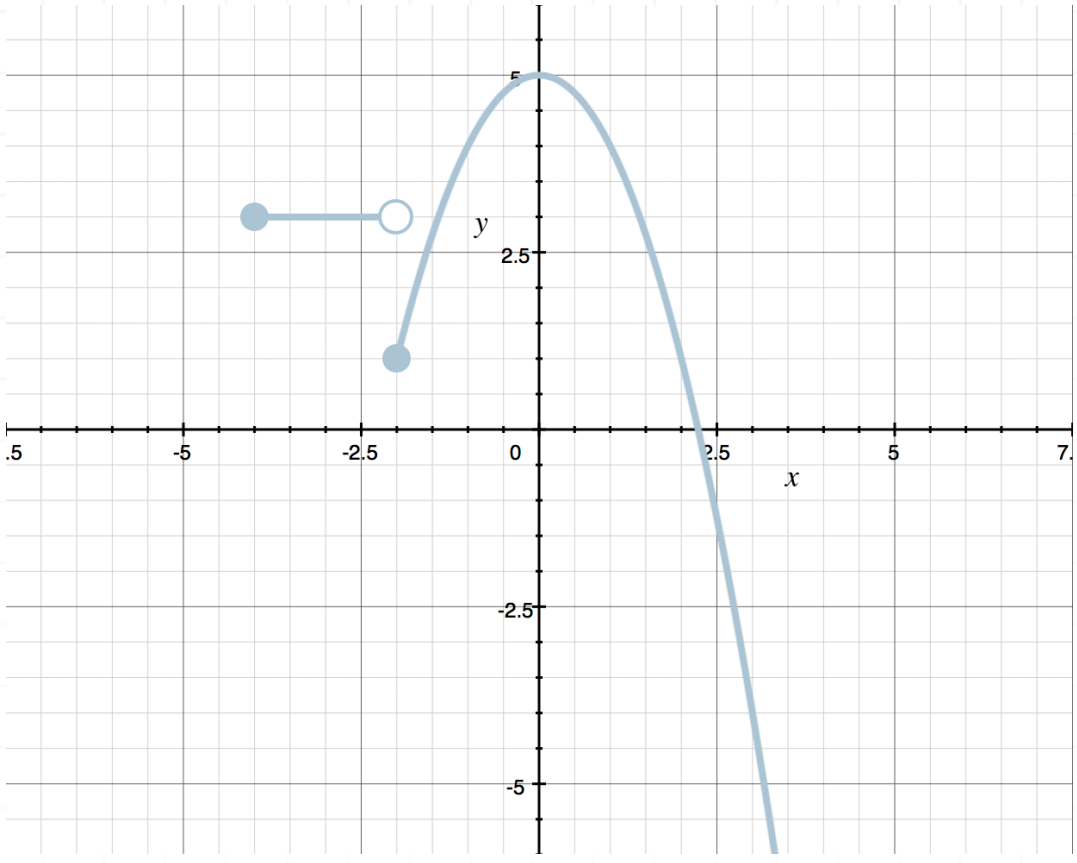

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SUM OF FUNCTIONS

1. Find $(f+h)(-1)$ if $f(x)=x^2+1$ and $h(x)=2x-2$.

2. Find and simplify $(h+g)(x)$ if $g(x)=x^2+3x-1$ and $h(x)=-2x^2+4x-5$.

3. If $f(-2)=6$, $g(-2)=-3$, and $h(-2)=4$, find $(f+g+h)(-2)$.

4. Find $f(x)$ and $g(x)$.

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

5. Let $a(x)=x^3-x^2+x-1$ and $b(x)=-x^3+x^2+x-1$. Determine the value of $(a+b)(-1)$.

6. If $f(0)=3$ and $(f+g)(0)=8$, find $g(0)$.

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PRODUCT OF FUNCTIONS

1. Find and simplify $(ab)(x)$ if $a(x) = x + 3$ and $b(x) = 5x - 4$.

2. Find $(fg)(-1)$ if $f(x) = x^2 + 3$ and $g(x) = x - 5$.

3. If $g(0) = -2$ and $(gh)(0) = -14$, find $h(0)$.

4. Given the expanded expression, determine $f(x)$ and $g(x)$.

$$(gf)(x) = x^2(x - 7) - x(x - 7) + 5(x - 7)$$

5. Find $(fh)(5)$ if $f(x) = -x^2 + 2x$ and $h(x) = 2x + 7$.

6. Find and simplify $(gh)(x)$ if $g(x) = x^2 + 1$ and $h(x) = 2x^2 + 3$.

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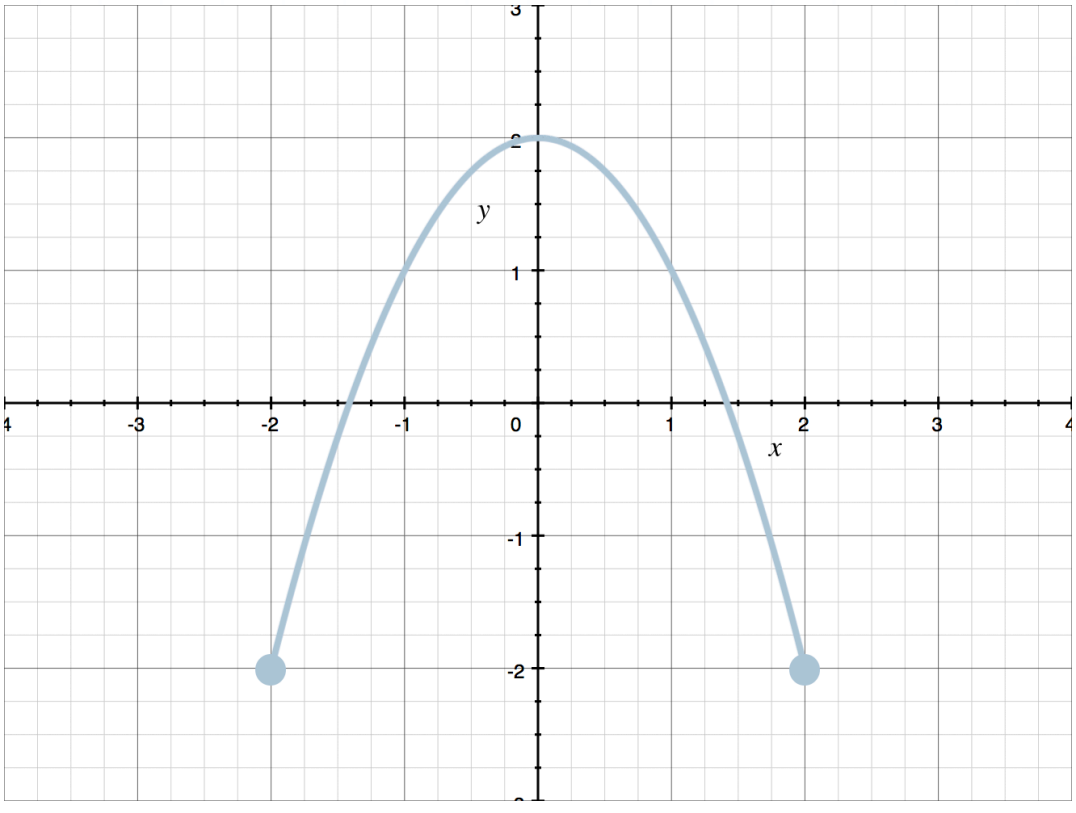
EVEN, ODD, OR NEITHER

1. Is the function even, odd, or neither?

$$f(x) = -x^5 + 2x^2 - 1$$

2. Describe the symmetry of an even function, and give an example of an even function.

3. Determine whether the graph represents a function that's even, odd, or neither.



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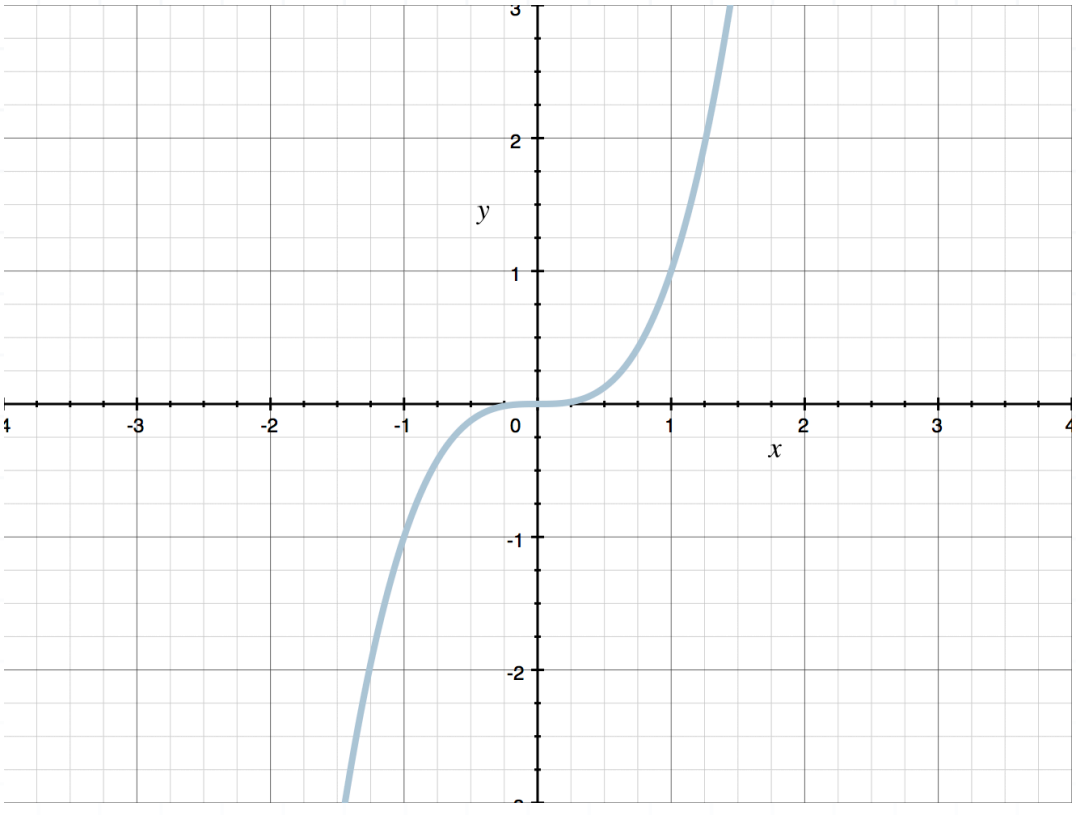
4. Determine whether the graph represents a function that's even, odd, or neither.



5. Is the function even, odd, or neither?

$$h(x) = x^3 - 3x$$

6. Is the function even, odd, or neither?

$$(-2,3),\ (-1,0),\ (0,-1),\ (1,0),\ (2,3)$$

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