Analyzing Graphs of Functions

https://www.clipconverter.cc/download/REUVU_mL/293123070/

Objectives (See more: http://www.mathsisfun.com/whole-numbers.html)

1. Familiarize with Concepts and Vocabulary
2. Domain and Range of a Function using Graphs
3. Determine if the graph is a function using a Vertical Line Test.
4. Determine if the function is Odd or Even or neither.
5. Find the zeros of a function.
6. Where is the graph increasing, decreasing, or constant?

Familiarize with Concepts and Vocabulary

Odd

Even

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

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

Exercise Odd, Even, or Neither?
Symmetrical with Y-axis is _____.
Answer: Even

Exercise
Odd, Even, or Neither?
Symmetrical with the origin is _____.
Answer: Odd

increasing function A function is increasing on an interval if $f(x2)>f(x1)$ whenever $x2>x1$

decreasing function A function is decreasing on an interval if f(x2)<f(x1) whenever x2>x1

A Function Every x-value has only one y-value.

Vertical Line Test If any vertical line passes through more than one point of the graph, then the relation is NOT a function.

Input A number in the domain of a relation.

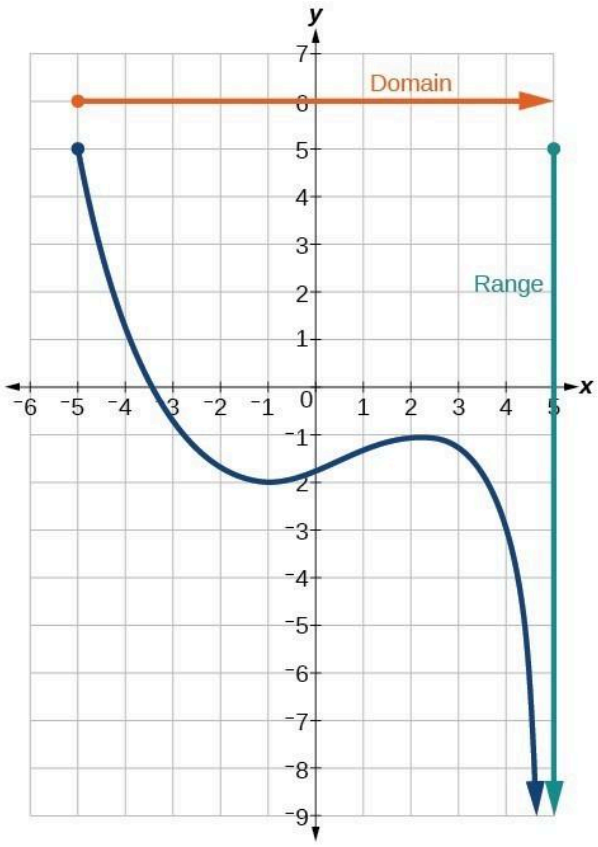
Output A number in the range of a relation.

Exercise Find the zeros of f(x) = (2x − 1)(x − 5) ?

Answer: 1/2, 5

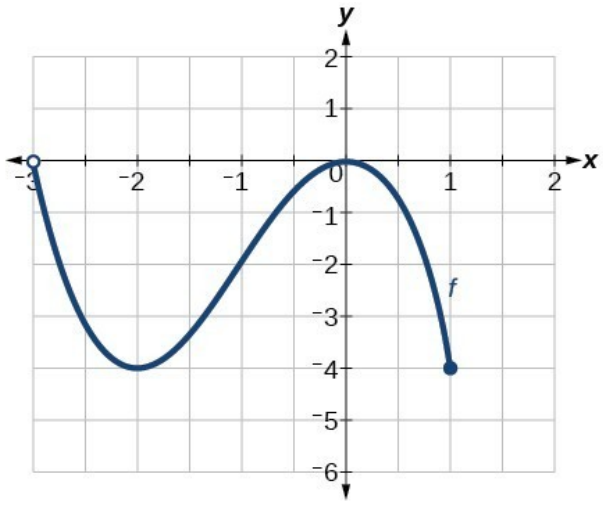
FINDING DOMAIN AND RANGE FROM A GRAPH

Find the domain and range of the function whose graph is shown in Figure 1.



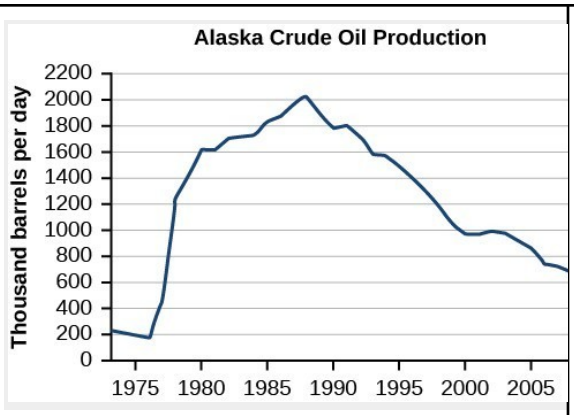
the domain is $[-5,\infty)$

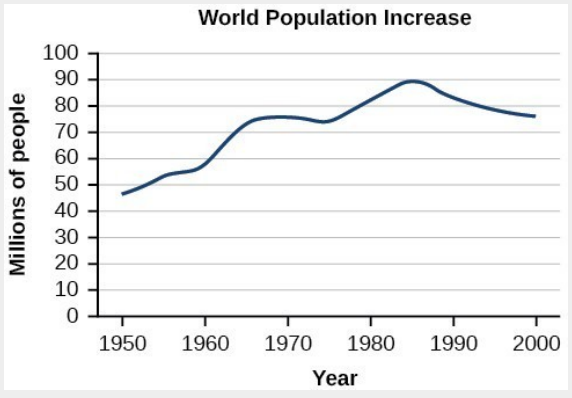
the range is $(-\infty,5]$.



the horizontal extent of the graph is –3 to 1, so the domain of is $(-3,1]$. The vertical extent of the graph is 0 to –4, so the range is $[-4,0)$.

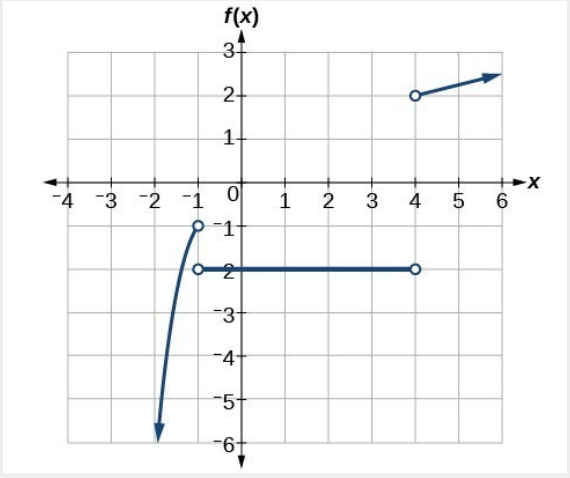
https://youtu.be/QAxZEelInJc





The domain as $1973 \le t \le 2008$ and the range as approximately $180 \le b \le 2010$.

D:
R:



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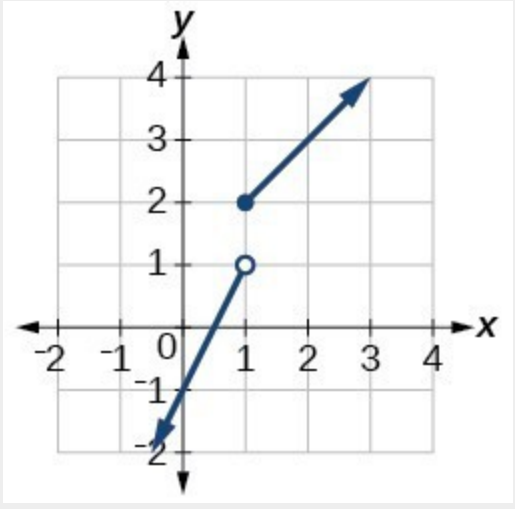

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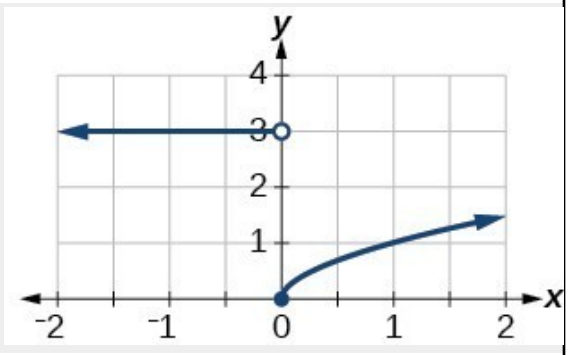

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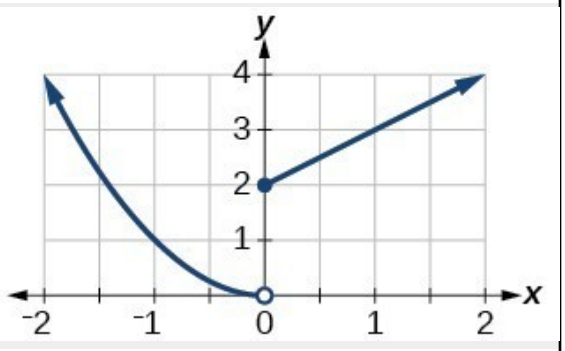

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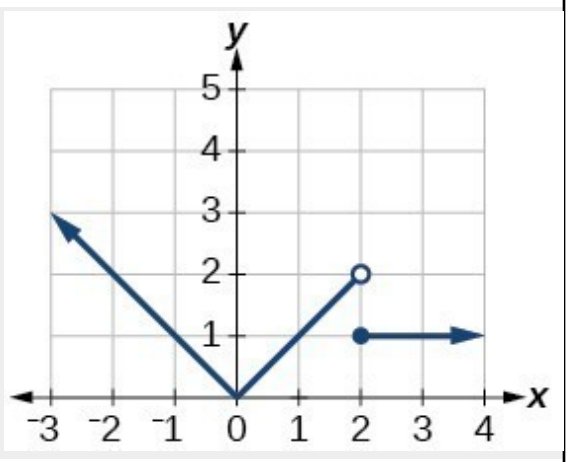
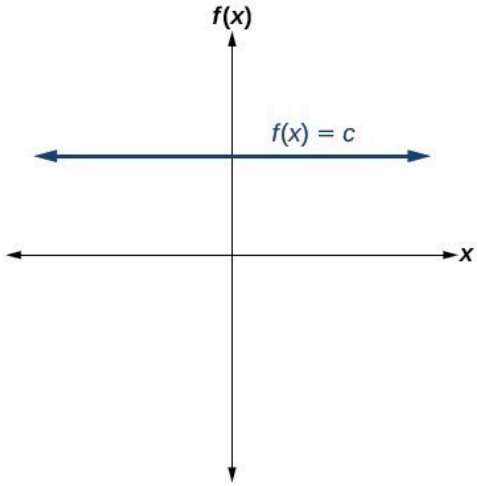
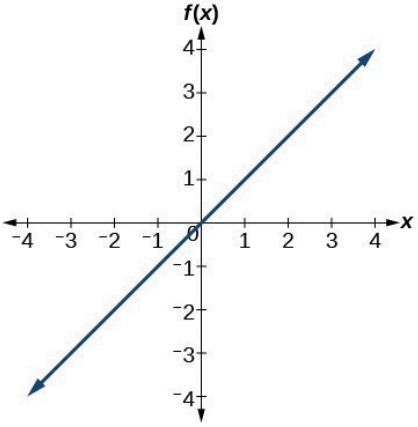
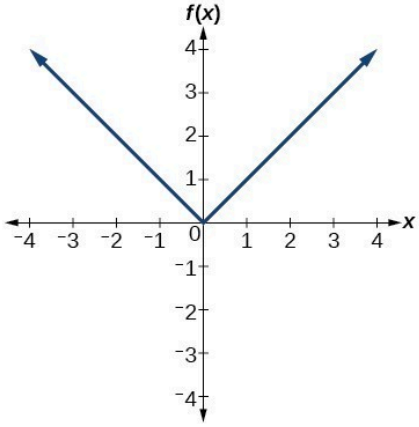
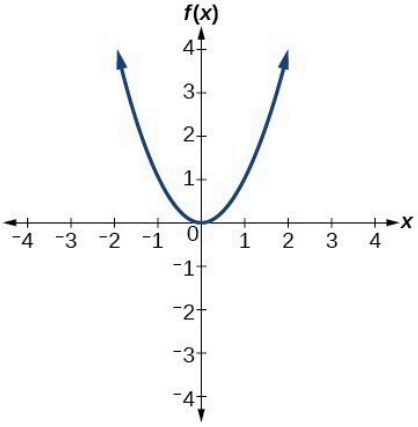
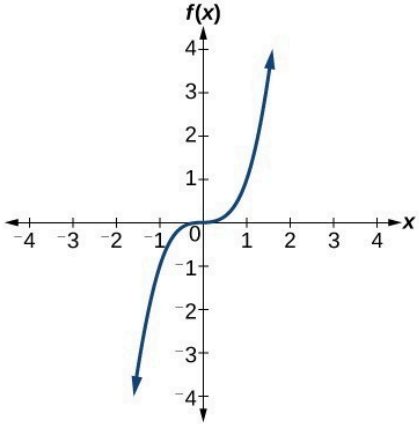
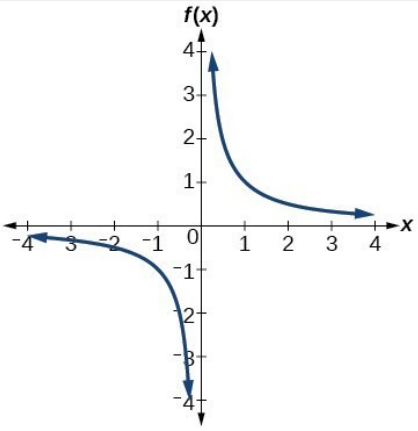
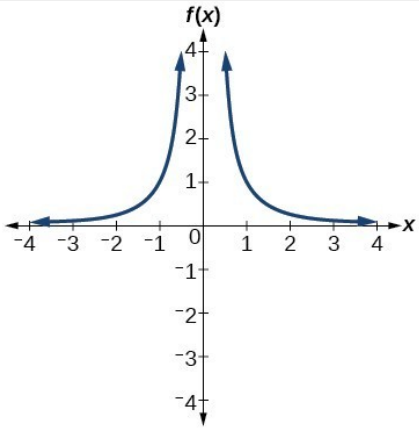
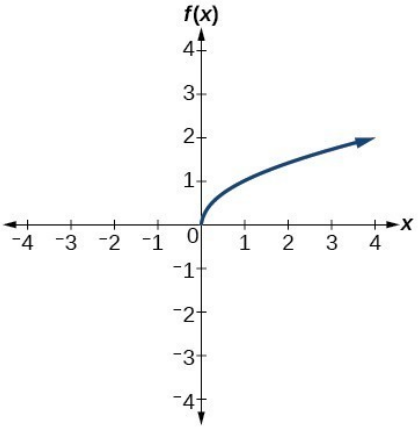
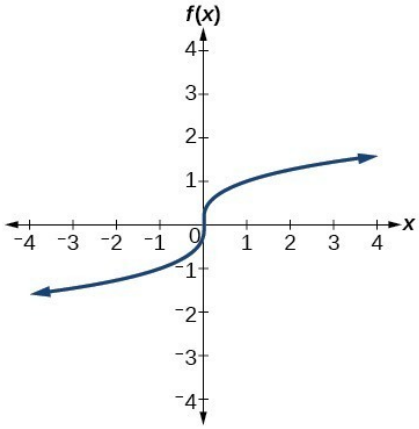




D: R:	Domain:(- ∞ , ∞) Range: [c,c]
 Domain: (−∞, ∞) Range: (−∞, ∞)	 Domain: (−∞, ∞) Range: [0, ∞)
 Domain: (−∞, ∞) Range: [0, ∞)	 Domain: (−∞, ∞) Range: (−∞, ∞)

 Domain: $(-\infty, 0) \cup (0, \infty)$ Range: $(-\infty, 0) \cup (0, \infty)$	 Domain: $(-\infty, 0) \cup (0, \infty)$ Range: $(0, \infty)$
	the **reciprocal squared function** $f(x)=1/x^2$
 Domain: $[0, \infty)$ Range: $[0, \infty)$	 Domain: $(-\infty, \infty)$ Range: $(-\infty, \infty)$
the **square root function** $f(x)=\sqrt{x}$	the **cube root function** $f(x)=\sqrt[3]{x}$,

HOW TO: GIVEN THE FORMULA FOR A FUNCTION, DETERMINE THE DOMAIN AND RANGE.

1. Exclude from the domain any input values that result in division by zero.
2. Exclude from the domain any input values that have nonreal (or undefined) number outputs.
3. Use the valid input values to determine the range of the output values.
4. Look at the function graph and table values to confirm the actual function behavior.

Find the domain and range of $f(x)=2x^3-x$.

There are no restrictions on the domain, as any real number may be cubed and then subtracted from the result.

The domain is $(-\infty,\infty)$ and the range is also $(-\infty,\infty)$.

Find the domain and range of $f(x)=x+12$.

We cannot evaluate the function at $\displaystyle -1-1$ because division by zero is undefined. The domain is $(-\infty,-1)\cup(-1,\infty)$. Because the function is never zero, we exclude 0 from the range. The range is $(-\infty,0)\cup(0,\infty)$.

Find the domain and range of $f(x)=2\sqrt{x+4}$.

We cannot take the square root of a negative number, so the value inside the radical must be nonnegative. $-4x+4\geq 0$ when $x\geq -4$

The domain of $f(x)$ is $[-4,\infty)$.

We then find the range. We know that $f(-4)=0$, and the function value increases as x increases without any upper limit. We conclude that the range of $[0,\infty)$.

Find the domain and range of

$f(x)=-\sqrt{(2-x)}$.

Reference:
https://courses.lumenlearning.com/ivytech-collegealgebra/chapter/find-domain-and-range-from-graphs/
https://courses.lumenlearning.com/ivytech-collegealgebra/chapter/find-domains-and-ranges-of-the-toolkit-functions/

Determine if the graph is a function using a Vertical Line Test.

Determine if the function is Odd or Even or neither.

Find the zeros of a function.

Where is the graph increasing, decreasing, or constant?

Sample Vocabulary Exercise:
Fill in the blanks.

1. The graph of a function is the collection of _____ _____ such that is in the domain of
2. The _____ _____ _____ is used to determine whether the graph of an equation is a function of in terms of
3. The _____ of a function are the values of for which $f(x)= 0$
4. A function is _____ on an interval if, for any and in the interval, implies $f(x_1) > f(x_2)$
5. A function value is a relative _____ of if there exists an interval containing such that $x_1 < x < x_2$ implies $f(x) >= f(x)$
6. The _____ _____ _____ _____ between any two points and is the slope of the line through the two points, and this line is called the _____ line.

7. A function is _____ if, for each in the domain of
8. A function is _____ if its graph is symmetric with respect to the -axis.

Answer to Sample Vocabulary Exercise: