Precalculus 1.2a WARM UP

- WHAT'S THE SLOPE OF A HORIZONTAL LINE? zero
- GIVE AN EXAMPLE OF A HORIZONTAL LINE $y=4$
- FIND THE SLOPE OF THE LINE GIVEN BY Y=3X-2 3
- IS YOUR ANSWER A NUMBER? Y/N
- WHAT DOES IT REPRESENT?
- Would a beginning downhill skier want the slope of a hill to be 1/10 or 9/10?

Jul 30-3:45 PM

37, 45, 51

Jan 5-10:32 AM

What questions do you have from 1.1?

Jul 30-2:54 PM

1.2: Functions

Relations

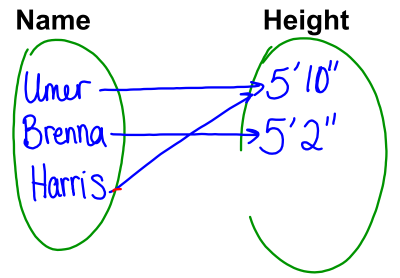
Definition 1. A *relation* is any set of ordered pairs.
The set of all first components (all the x-values) is called the "domain."
The set of all second components (all the y-values) is called the "range."

Example 1
Find the domain and range of: $\{(0,9.1),(10,6.7),(20,10.7),(30,13.2),(36,17.4)\}$

D: $\{0,10,20,30,36\}$

R: $\{9.1, 6.7, 10.7, 13.2, 17.4\}$

Dec 15-9:59 AM



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Functions

Definition 2. A *function* is a correspondence from a first set (the domain) to a second set (the range) such that each element in the domain corresponds to **exactly one** element in the range.

Based on the definition above, in a function, no two ordered pairs have the same first component and different second components.

Each input has exactly one corresponding output.

Q: Was the previous relation (from Example 1) a function? Why or why not?

$\{(0,9.1),(10,6.7),(20,10.7),(30,13.2),(36,17.4)\}$

A: Function

Dec 15-10:03 AM

Example 2
Determine which (if any) of the following are functions.

[A] $\{(1,2),(3,4),(5,6),(5,8)\}$

Nope

[B] $\{(1,2),(3,4),(6,5),(8,5)\}$

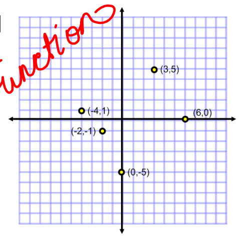
Yep

[C] Domain: A set of cars in a parking lot
Correspondence: Each car's license number
Range: A set of letters and numbers

Yes

Dec 15-10:05 AM

[D] Function

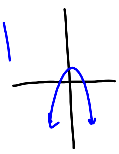


Vertical Line Test

[E] $x^2 + y = 1$

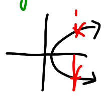
$y = -x^2 + 1$

Yes



[F] $-x + y^2 = 1$

$y = \pm\sqrt{x+1}$



p. 25: #13-15 (HW)

Not Function

Jul 30-2:24 PM

Notation for Functions

Oftentimes, we write $f(x)$ instead of y:

$y = 6 - 2x$ is the same as $f(x) = 6 - 2x$

$f(x)$ can be a little more convenient to use because it is more specific than just writing y. For example, if we wanted to find what y is when $x = 2$, we can write and plug in 2 every time we see x.

Q: What is y when $x = 2$ (from the equation above)?

A: $y = 6 - 2(2)$ $\quad f(2) = 6 - 2(2)$

$y = 2$ $\quad f(2) = 2$

Dec 15-10:07 AM

Example 3

Let $f(x) = x^2 - 2x + 6$.

You can use a graphing calculator for part [A].

[A] $f(-5) = (-5)^2 - 2(-5) + 6$

$25 + 10 + 6$

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[B] $f(a+4) = (a+4)^2 - 2(a+4) + 6$

$(a+4)(a+4) - 2a - 8 + 6$

$a^2 + 8a + 16 - 2a - 8 + 6 = a^2 + 6a + 14$

[C] $f(-x) = (-x)^2 - 2(-x) + 6$

$x^2 + 2x + 6$

p. 25: #27 (HW)

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Example 4 (Piece-wise Functions)

p. 25, #39

$f(x) = \begin{cases} x^2 + 2, & \underline{x \le 1} \\ 2x^2 + 2, & \underline{x > 1} \end{cases}$

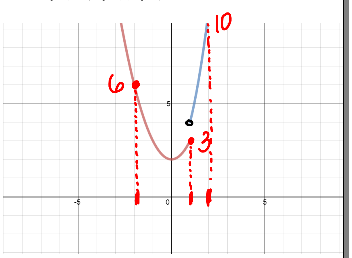
Find

$f(-2), f(1), f(2)$

$f(-2) = (-2)^2 + 2 = 6$

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

$f(2) = 2(2)^2 + 2 = 10$



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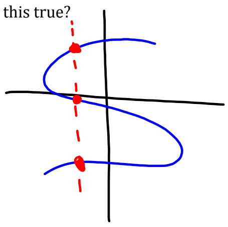
Vertical Line Test

We know that a function can only have one y-value for each $\underline{\text{x value}}$.
Hence, if a vertical line intersects a graph in more than one point, the graph does not represent a function.

Why is this true?



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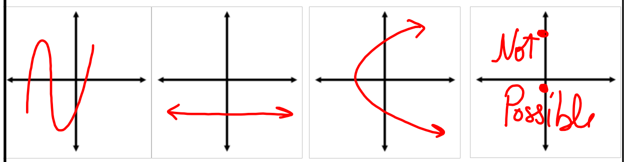
Example 5
Draw [A] an example of a graph that represents a function and has three x-intercepts, [B] a function that has one y-intercept and no x-intercepts, [C] a graph that does not represent a function, and [D] a function that has two y-intercepts.



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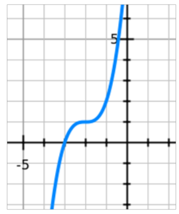
Q: Is it possible to draw a function with more than one y-intercept? Why or why not?
A: No!

Example 6
Use the graph of f on the right to find:



[A] $f(-3) =$ 0

[B] $f(-2) =$ 1

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Conclusion

1. How do you know an equation is a function?
2. What does function notation do for you?
3. What is important about piecewise functions?
4. Questions?????

Jan 5-4:10 PM

HOMEWORK

...functions...the building block of analytical geometry

1.2a (p. 24): 1,2, 13-23 odd, 27, 33-37 odd

Jul 30-3:45 PM