Home on the Range and Domain

Function

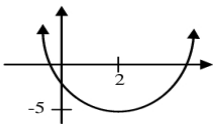
- A function basically means for any one input, there is exactly one output.
- Linear equations are functions because whatever you sub in for x, you'll get ONLY one y.
- For instance: $y = 2x + 3$ is a linear equation. No matter what you sub in for x, you will only get one number for y.
- If you're shown a graph, and asked if it's a function, just do the vertical line test (VLT). If you can draw a vertical line anywhere on the graph, and it only hits your graph once, it's a function. If it hits more than once, it's NOT a function.
- So if you're given a set of points for a graph: (4, 3) (4, 2) (5, 7) (-6, -3) This would NOT be a function, because for the x value of 4, there are two different y values.
- Functions are often written in mathematics like this: $y = f(x)$, so instead of writing $y = 2x + 3$, you might see $f(x) = 2x + 3$. This just means that if you were asked to find the value for a function $f(x) = 2x + 3$ when $x = 2$, it just means sub in 2 for x and solve.

Domain and Range

- The **Domain** is the set of permissible inputs and the **Range** is the set of resulting outputs.
- This means that the Domain represents all the numbers that x can equal, and the Range is all the numbers that y could equal.
- In mathematics, they sometimes use different letters than x and y, so the definition is usually put in terms of input and output.
- When finding the domain of a function, ask yourself what values CAN'T be used. Your domain is then everything else.
- There are simple basic rules to consider: The domain of all polynomial functions is the Real numbers **R**.
- So the domain of $y = x^2 - 3x - 25$ is R (All Real Numbers)
- $D = \{x \in R\}$
- As for figuring out the Range, just look at the graph to see all the number that y could equal. In the linear equation from above, the range can also be any number from the Real number set.
- $R = \{y \in R\}$
- In quadratic functions, the resulting graph shapes are parabolas that open up or down. The result is that the x-values can be anything but the y-values are limited by the max/min point known as the vertex.
- For example, the function $g(t) = -3 (t-2)^2 + 5$ has a vertex at (2, 5) and open downwards. $D = \{x \in R\}$, $R = \{y \leq 5, y \in R\}$

Practice

State the domain and range for each of the following:

1. (1, 2), (2, 3), (3, 4), (4, 5), (5, 6)
2. 

3. $d(y) = y + 3$
4. $g(k) = 2(k-3)^2 - 8$