

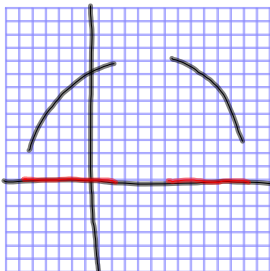
**Def<sup>n</sup>**  
 A function consists of a domain (a set  $A$ , for us usually a subset of the real numbers) and a rule that assigns each element  $x$  of  $A$  to exactly one element, called  $f(x)$ , of a set  $B$  (again for us usually the real numbers)

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**Domain:** The set of numbers that "go into" the function. Either given to you explicitly, or assumed to be all the numbers that are "legal" to plug into the rule (function)  
 eg the domain of  $f(x) = \frac{1}{x}$  is  $\mathbb{R} - \{0\}$   
 the domain of  $f(x) = \ln x$  is  $\{x \mid x > 0\}$

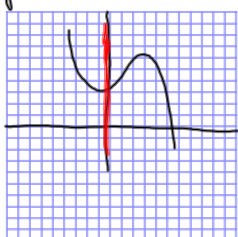
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if you think of the graph of a function, the domain is the "shadow" on the  $x$ -axis.



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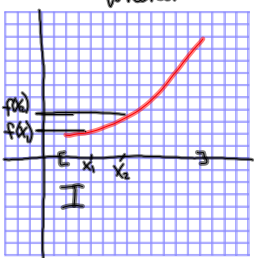
The range of a function is all the numbers that "come out" of the function. can think of this as the "shadow" on the  $y$ -axis (lights both to the left and right)



range  $[-2, 9]$

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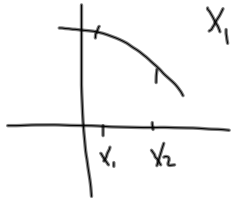
A function is increasing (ie the graph is going up as you look from left to right) on an interval  $I$ , if  $f(x_1) < f(x_2)$  whenever  $x_1 < x_2$  in  $I$ .



$x_1 < x_2$   
 $f(x_1) < f(x_2)$

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A function is decreasing if  $f(x_1) > f(x_2)$  whenever  $x_1 < x_2$ .



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2, 24, 28, 30, 36.  
20,  
42.

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$$f(x) = x^3$$
$$\frac{f(a+h) - f(a)}{h}$$

=

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