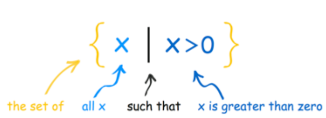
Topic 2: Functions and Equations	*Polynomials*
The Remainder Theorem states:	The Factor Theorem states:
If a polynomial $f(x)$ is divided by $x - k$, then $remainder = f(k)$	A polynomial $f(x)$ has a factor $(x - k)$ if and only if : $f(k) = 0$

Polynomial function: Factors, Roots, Zeros $y = x^2 + 2x - 15$	Factors are: $(x + 5)$ and $(x - 3)$	The line of symmetry of $y = ax^2 + bx - c$ is: $x = \frac{-b}{2a}$
	Zeros are: -5 and 3	This can also be used to find turning point of quadratic by plugging x
	X-Intercepts are at: -5 or -3	
	Roots/Solutions are: $x = 5$ or 3	

The number of solutions of a quadratic equation depends on the value of the discriminant:	$\Delta = b^2 - 4ac$		
	$\Delta > 0$ *2 Real distinct solutions*	$\Delta = 0$ *One Real Solution*	$\Delta < 0$ *No real solutions*

Topic 2: Functions and Equations	*The Theory of Functions*
Function: A set of ordered pairs in which every x-value has a unique y-value.	
In order to be a function, the graph of an equation must pass the vertical and horizontal line test	
The Vertical Line Test States:	A relation is a function if a vertical line intersects the graph of a relation at only one point,
The Horizontal Line Test States:	A function is a one-to-one function if a horizontal line crosses the graph once. Otherwise, it is a many-to-one function

Rationale Functions are a ratio of two polynomials: $f(x) = \frac{ax + b}{cx + d}$	Asymptote & intercepts of a rational function:		
	Vertical Asymptote: $VA = -\frac{d}{c}$ *(where y is impossible, thus $denominator = 0$)*		
	Horizontal Asymptote: HA	$\deg(\text{num}) = \deg(\text{den}) \rightarrow$	$= \frac{a}{c}$ *(substitute ∞ for x)*
		$\deg(\text{num}) < \deg(\text{den}) \rightarrow$	$= 0$
		$\deg(\text{num}) > \deg(\text{den}) \rightarrow$	$= none$
	X-intercept: $x = -\frac{b}{a}$ *(where $y = 0$)*		
	Y-intercept: $y = \frac{b}{d}$ *(where $x = 0$)*		

Interval Notation	Set Builder Notation
	

A function is odd when: $f(-x) = -f(x)$	
A function is even when: $f(-x) = f(x)$	
Inverse functions: $f^{-1}(x)$	Reflection of $f(x)$ on the line $y = x$
	Swaps domain and range of $f(x)$
	$f(f^{-1}(x)) = f(x)$

Topic 2: Functions and Equations	*Transformations of Graphs*	
Shifts	$y = f(x-h)$ shifts $y = f(x)$ to the right by h units	
	$y = f(x+h)$ shifts $y = f(x)$ to the left by h units	
	$y = f(x) + k$ shifts $y = f(x)$ up by h units	
	$y = f(x) - k$ shifts $y = f(x)$ down by h units	
Reflections	$y = f(-x)$ reflects $y = f(x)$ across the y-axis	
	$y = -f(x)$ reflects $y = f(x)$ across the x-axis	
Stretches	If $a > 1$, transformation is a stretch	If $a < 1$, transformation is a compress
	$y = f(ax)$ stretches/compresses $y = f(x)$ horizontally, by $\frac{1}{a}$	
	$y = af(x)$ stretches/compresses $y = f(x)$ vertically, by a	
Modulus	$\lvert f(x) \rvert$	Turns all x values positive
	$f(\lvert x \rvert)$	Reflects the graph to the right of the y-axis in the y-axis Ignore the left hand side part of the graph
$\frac{1}{f(x)}$	Zeros of $f(x)$ (when they exist) are the vertical asymptotes of $\frac{1}{f(x)}$	Zeros of $\frac{1}{f(x)}$ are the vertical asymptotes of $f(x)$
	If c the y-intercept of $f(x)$, then $\frac{1}{c}$ is the y-intercept of $\frac{1}{f(x)}$	
	The minimum value of $f(x)$ is the maximum of $\frac{1}{f(x)}$	The minimum value of $\frac{1}{f(x)}$ is the maximum of $f(x)$
	When $f(x) > 0$, $\frac{1}{f(x)} > 0$	When $f(x) < 0$, $\frac{1}{f(x)} < 0$
	When $f(x)$ approaches 0, $\frac{1}{f(x)}$ will approach $\pm\infty$	When $f(x)$ approaches $\pm\infty$, $\frac{1}{f(x)}$ approaches 0