12.0 Algebra 2 Review

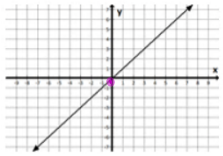
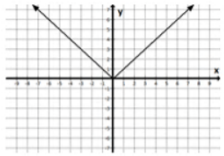
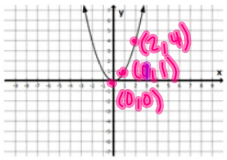
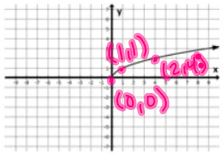
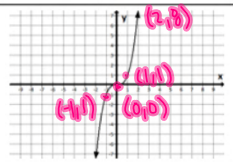
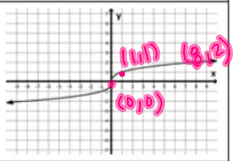
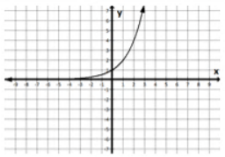
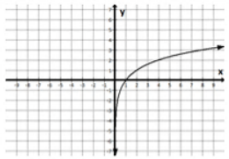
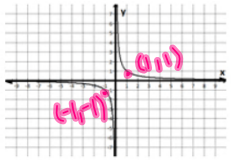
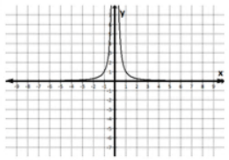
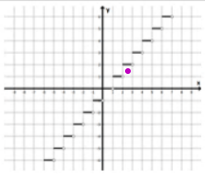
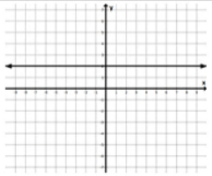
Essential Question

How do I graph a piecewise function?

How do I find a composition of functions or the inverse of a function?

12.0 Algebra 2 Review

Essential Question How do I graph a piecewise function?

Parent Function	Graph	Parent Function	Graph
$\boxed{y=x}$ **Linear**, Odd Domain: $(-\infty,\infty)$ Range: $(-\infty,\infty)$ End Behavior: $x\to-\infty,\ y\to-\infty$ $x\to\infty,\ y\to\infty$		$y=\lvert x\rvert$ **Absolute Value**, Even Domain: $(-\infty,\infty)$ Range: $[0,\infty)$ End Behavior: $x\to-\infty,\ y\to\infty$ $x\to\infty,\ y\to\infty$	
$y=x^2$ **Quadratic**, Even Domain: $(-\infty,\infty)$ Range: $[0,\infty)$ End Behavior: $x\to-\infty,\ y\to\infty$ $x\to\infty,\ y\to\infty$		$y=\sqrt{x}$ **Radical**, Neither Domain: $[0,\infty)$ Range: $[0,\infty)$ End Behavior: $x\to\infty,\ y\to\infty$	
$y=x^3$ **Cubic**, Odd Domain: $(-\infty,\infty)$ Range: $(-\infty,\infty)$ End Behavior: $x\to-\infty,\ y\to-\infty$ $x\to\infty,\ y\to\infty$		$y=\sqrt[3]{x}$ **Cube Root**, Odd Domain: $(-\infty,\infty)$ Range: $(-\infty,\infty)$ End Behavior: $x\to-\infty,\ y\to-\infty$ $x\to\infty,\ y\to\infty$	
$y=b^x,\ b>1$ **Exponential**, Neither Domain: $(-\infty,\infty)$ Range: $(0,\infty)$ End Behavior: $x\to-\infty,\ y\to0$ $x\to\infty,\ y\to\infty$		$y=\log_b(x),\ b>1$ **Log**, Neither Domain: $(0,\infty)$ Range: $(-\infty,\infty)$ End Behavior: $x\to0^+,\ y\to-\infty$ $x\to\infty,\ y\to\infty$	
$y=\frac{1}{x}$ **Rational (Inverse)**, Odd Domain: $(-\infty,0)\cup(0,\infty)$ Range: $(-\infty,0)\cup(0,\infty)$ End Behavior: $x\to-\infty,\ y\to0$ $x\to\infty,\ y\to0$		$y=\frac{1}{x^2}$ **Rational (Inverse Squared)**, Even Domain: $(-\infty,0)\cup(0,\infty)$ Range: $(0,\infty)$ End Behavior: $x\to-\infty,\ y\to0$ $x\to\infty,\ y\to0$	
x 2.5 y=2 ☆ $y=\text{int}(x)=[x]$ **Greatest Integer**, Neither skip Domain: $(-\infty,\infty)$ Range: $\{y: y\in\mathbb{Z}\}$ (integers) End Behavior: $x\to-\infty,\ y\to-\infty$ $x\to\infty,\ y\to\infty$		$y=C$ ($y=2$ in the graph) **Constant**, Even Domain: $(-\infty,\infty)$ Range: $\{y: y=C\}$ End Behavior: $x\to-\infty,\ y\to C$ $x\to\infty,\ y\to C$	

12.0 algebra 2 review

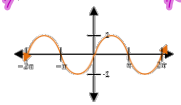
essential question How do I graph a piecewise function?

Parent Functions

Trigonometric:

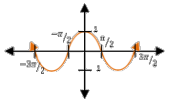
	S	C	T
0	0	1	0
$\pi/2$	1	0	U
π	0	-1	0
$3\pi/2$	-1	0	U

$f(x) = \sin x$



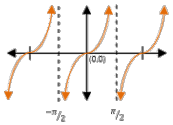
Domain: $(-\infty, \infty)$
Range: $[-1,1]$

$f(x) = \cos x$



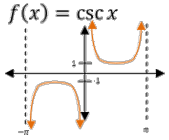
Domain: $(-\infty, \infty)$
Range $[-1,1]$

$f(x) = \tan x$



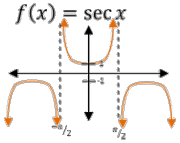
Domain: All reals except $\left(n + \frac{1}{2}\right)\pi, n = 0, \pm 1, \pm 2$
Range: $(-\infty, \infty)$

$f(x) = \csc x$



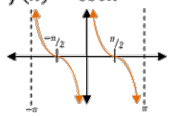
Domain: All reals except $n\pi$, $n = 0, \pm 1, \pm 2 \ldots$
Range: $(-\infty, 1] \cup [1, \infty)$

$f(x) = \sec x$



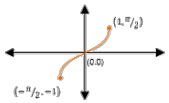
Domain: All reals except $\left(n + \frac{1}{2}\right)\pi$, $n = 0, \pm 1, \pm 2 \ldots$
Range $(-\infty, 1] \cup [1, \infty)$

$f(x) = \cot x$



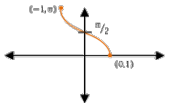
Domain: All reals except $n\pi$, $n = 0, \pm 1, \pm 2 \ldots$
Range: $(-\infty, \infty)$

$f(x) = \sin^{-1} x$



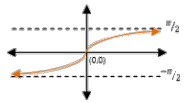
Domain: $[-1,1]$
Range: $[-\pi/2, \pi/2]$

$f(x) = \cos^{-1} x$



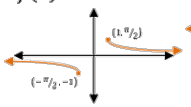
Domain: $[-1,1]$
Range: $[0, \pi]$

$f(x) = \tan^{-1} x$



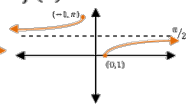
Domain $(-\infty, \infty)$
Range: $(-\pi/2, \pi/2)$

$f(x) = \csc^{-1} x$



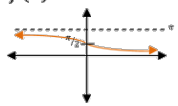
Domain: $(-\infty, -1] \cup [1, \infty)$
Range $[-\pi/2, 0) \cup (0, \pi/2]$

$f(x) = \sec^{-1} x$



Domain: $(-\infty, -1] \cup [1, \infty)$
Range: $[0, \pi/2) \cup (\pi/2, \pi]$

$f(x) = \cot^{-1} x$



Domain: $(-\infty, \infty)$
Range: $(0, \pi)$

12.0 Algebra 2 Review

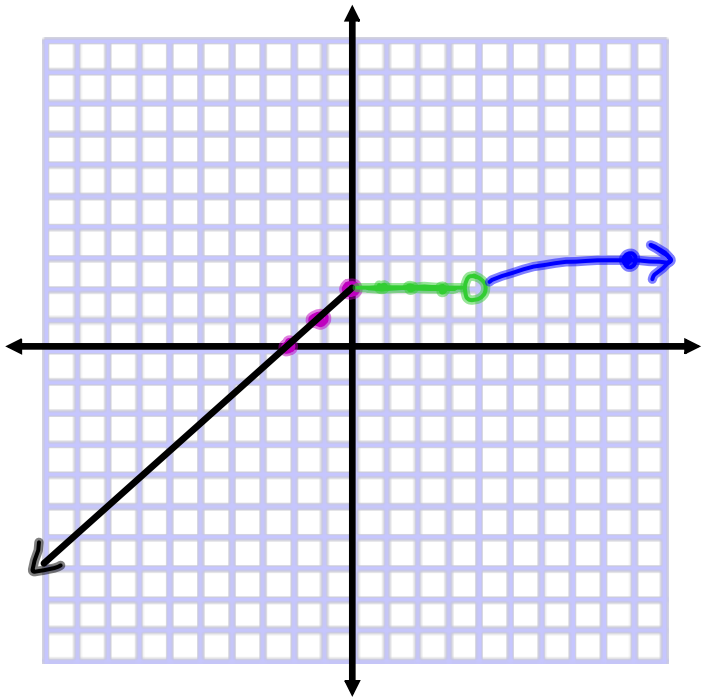
Essential Question How do I graph a piecewise function?

Piece Wise Functions

ex.

$$f(x)=\begin{cases} x+2, & x\le 0 \\ 2, & 0<x<4 \\ \sqrt{x}, & x>4 \end{cases}$$

x	y
-2	0
-1	1
0	2
9	3



12.0 Algebra 2 Review

Essential Question How do I find a composition or inverse of functions?

Compositions

$f(g(1))$ work on inside out

ex. If $f(x)=2x+1$ and $g(x)=x^2$, find $g \circ f(3) = g(f(3))$

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

7

$g(7)=7^2$

$\boxed{49}$

ex. If $f(x)=\frac{1}{x-1}$ and $g(x)=x+2$, find...

$f(g(1))$

$g(1)=1+2$

$=3$

$f(3)=\frac{1}{3-1}=\boxed{\frac{1}{2}}$

$f(g(x))$

$f(x+2)$

$=\frac{1}{(x+2)-1}$

$=\boxed{\frac{1}{x+1}}$

$g(f(1))$

$\frac{1}{1-1}=\frac{1}{0}$

$\boxed{\text{undefined}}$

$g(f(x))$

$g\left(\frac{1}{x-1}\right)$

$\boxed{\frac{1}{x-1}+2}$

12.0 Algebra 2 Review

Essential Question How do I find a composition or inverse of functions?

Inverses

Switch your x & y

ex. Find the inverse of $f(x)$ $y = \frac{1}{2}x^3 - 4$

$f^{-1}(x) = \sqrt[3]{2x+8}$

$g(x)$

$f(g(x)) = \frac{1}{2}\left(\sqrt[3]{2x+8}\right)^3 - 4$

$= \frac{1}{2}(2x+8) - 4$

$= 1x + \cancel{4} - \cancel{4}$

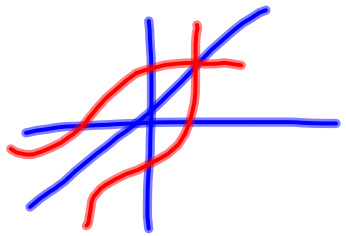
$= x$ ✓

$x = \frac{1}{2}y^3 - 4$

$+4 \qquad +4$

$2(x+4) = \left(\frac{1}{2}y^3\right)2$

$\sqrt[3]{2x+8} = \sqrt[3]{y^3}$



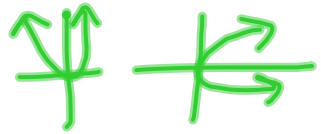
If f(g(x)) = g(f(x)) = x, then f(x) and g(x) are inverses.

One-to-One Functions

-inverse is also a function

- Every y has one x
- Horizontal Line Test

NOT



YES