October 28

Does the function $y = x^2$ have an inverse function?
Why or why not?

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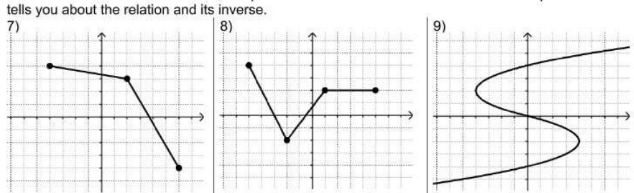
Students will verbally explain how to graph and evaluate inverse trig functions
(using the words:
domain, range, angle ...)

Inverses (pp. 2 of 2)

Tell whether each relation below would pass a vertical or horizontal "line test." Then explain what this tells you about the relation and its inverse.



7) Does the relation pass the vertical line test?

Does the relation pass the horizontal line test?

What does this tell you about the relation?

8) Does the relation pass the vertical line test?

Does the relation pass the horizontal line test?

What does this tell you about the relation?

9) Does the relation pass the vertical line test?

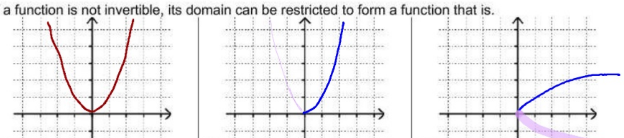
Does the relation pass the horizontal line test?

What does this tell you about the relation?

Terminology

All functions have the property that each element in the domain is paired with only one element in the range. A function is said to be ***one-to-one*** if each range value is also paired with only one element from the domain.
One-to-one functions will pass both the vertical and horizontal line tests.
This type of function is also said to be ***invertible***, meaning that its inverse is also a function.
If a function ***f*(*x*)** is *invertible*, then its inverse can be named with the notation $f^{-1}(x)$.

If a function is not invertible, its domain can be restricted to form a function that is.



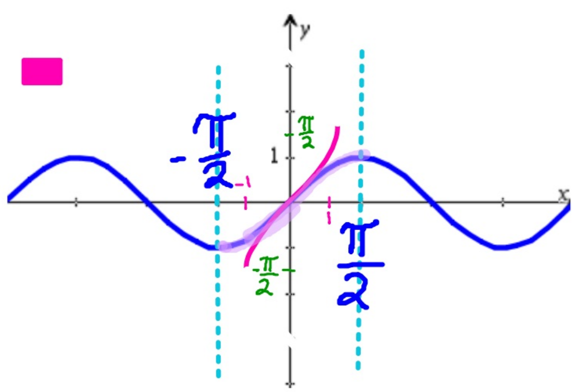
10) Graph $f(x) = x^2$.

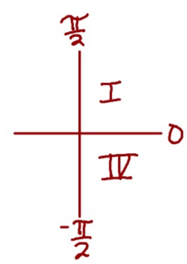
11) Restrict the domain of $f(x)$ to make the function invertible.
$f(x) = x^2$, $x \geq 0$
$x \leq 0$

12) Sketch $f^{-1}(x)$.
$f^{-1}(x) = \sqrt{x}$
$-\sqrt{x}$

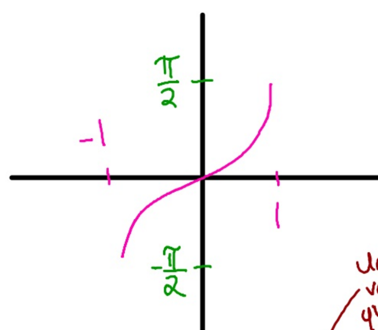
Inverse of sin(x)

Arcsin(x)





Arcsin(x)
$(\sin^{-1}(x))$
answer is an angle



Unit circle values in quadrants 1+4

Domain: $-1 \leq x \leq 1$
Range: $-\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$

$\sin\left(\frac{\pi}{4}\right) = \frac{\sqrt{2}}{2}$

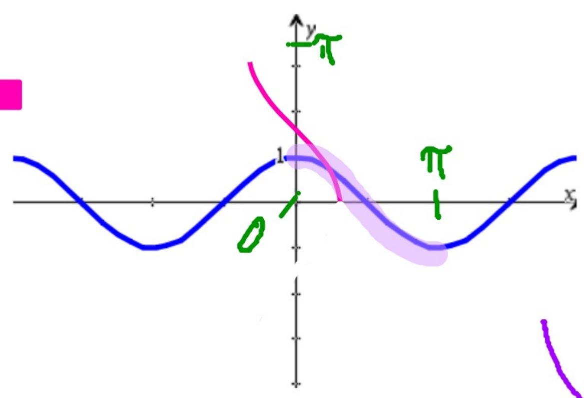
$\arcsin\left(\frac{\sqrt{3}}{2}\right) = \frac{\pi}{3}$ $\quad \left(\sin^{-1}\left(\frac{\sqrt{3}}{2}\right) = \frac{\pi}{3}, \frac{2\pi}{3}, \cdots\right)$

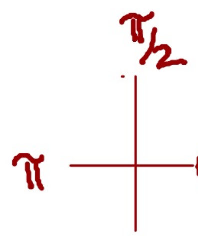
$\arcsin\left(-\frac{1}{2}\right) = -\frac{\pi}{6}$ $\quad \left(\sin^{-1}\left(-\frac{1}{2}\right) = \frac{7\pi}{6}, \frac{11\pi}{6}, -\frac{\pi}{6}\right)$

Inverse of $\cos(x)$

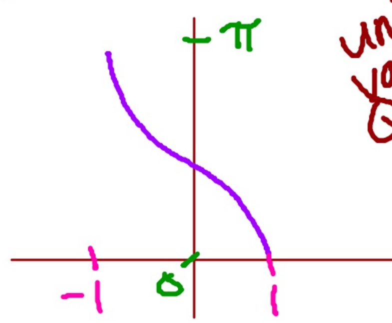
$\arccos(x)$

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





unit circ
values i
Q 1+2

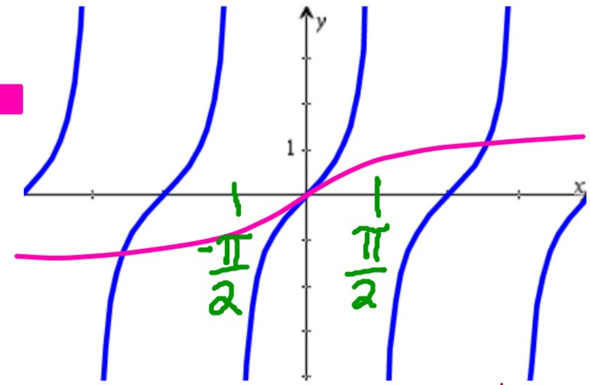


Domain: $-1 \leq x \leq 1$

Range: $0 \leq y \leq \pi$

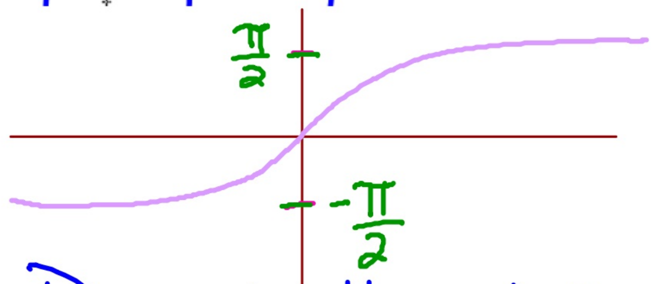
Inverse of tan(x)

arctan(x)



unit circle values in Quadrants 1+4

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



Domain: all real #s

Range: $-\frac{\pi}{2} \le y \le \frac{\pi}{2}$

Evaluate

arcsin(1) $= \frac{\pi}{2}$

arccos(1/2) $= \frac{\pi}{3}$

arctan(0) $= 0$

$\sin^{-1}(1/2) = \frac{\pi}{6}, \frac{5\pi}{6}, -\frac{7\pi}{6}, -\frac{11\pi}{6}, \ldots$

$\cos^{-1}(1) = 0, -2\pi, 2\pi, \ldots$

$\tan^{-1}(1) = \frac{\pi}{4}, \frac{5\pi}{4}, -\frac{7\pi}{4}, -\frac{3\pi}{4}, \ldots$