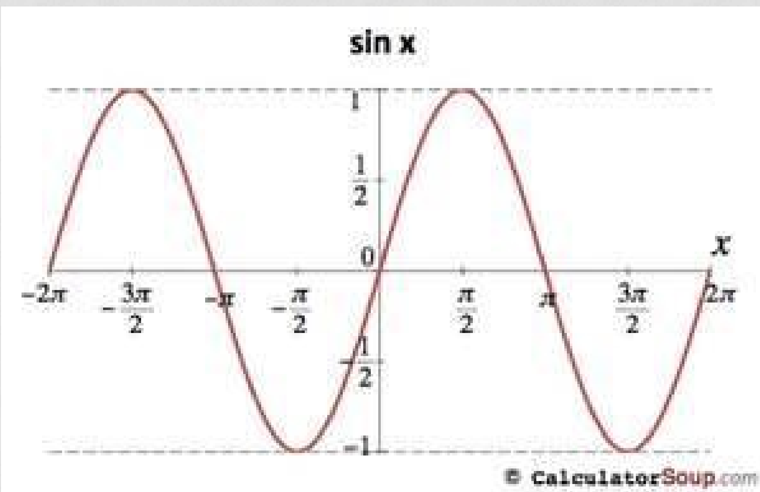
INVERSE TRIGONOMETRIC FUNCTIONS

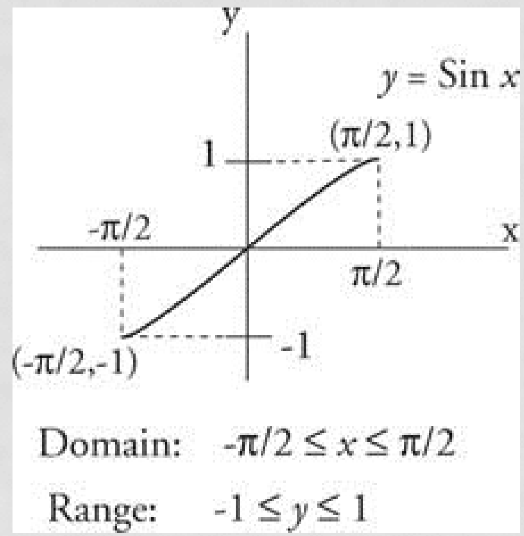
SECTION 4.7

THE SINE FUNCTION

The graph of y=sinx is not 1-1 so it does not have an inverse.



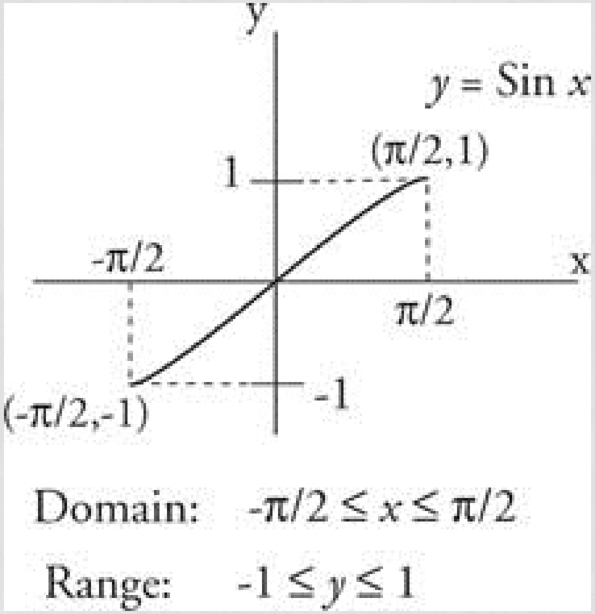
If we restrict the function to a specific domain, it becomes 1-1 and takes on all values of the range.

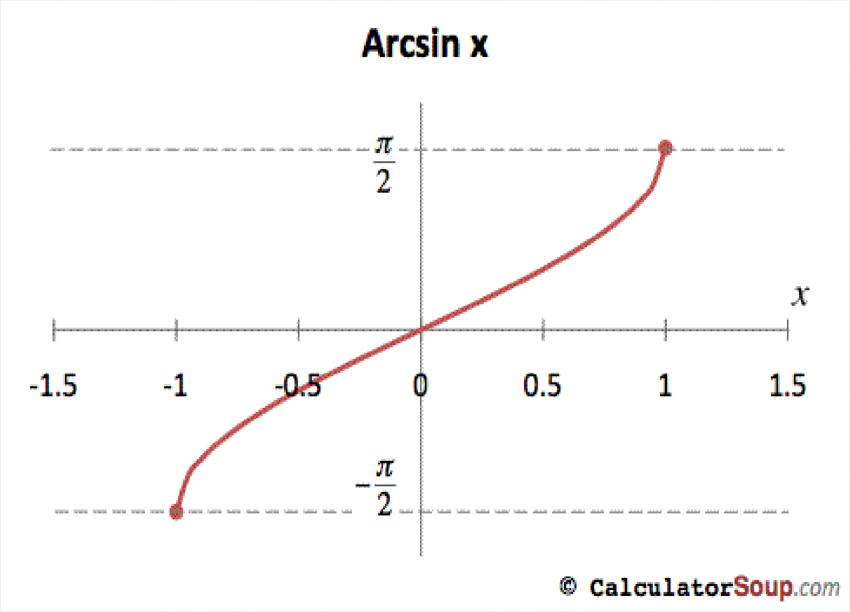


THE INVERSE SINE FUNCTION

Using the properties of inverses we discussed earlier, we switch input and outputs to get the inverse sine function.

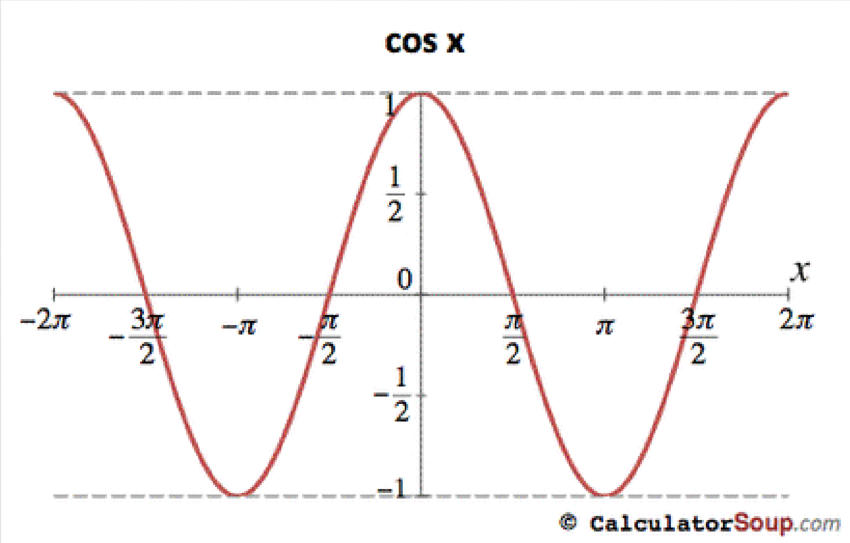
Note that the domains and ranges have switched.



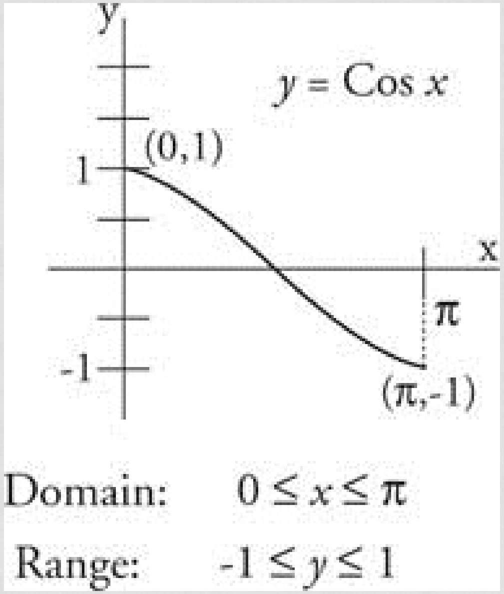


THE COSINE FUNCTION

Similarly y=cosx is not 1-1

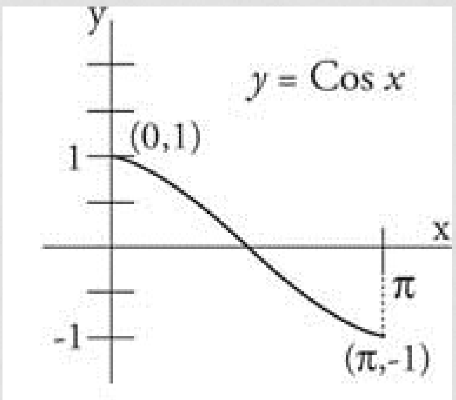


So we restrict it appropriately



INVERSE COSINE FUNCTION

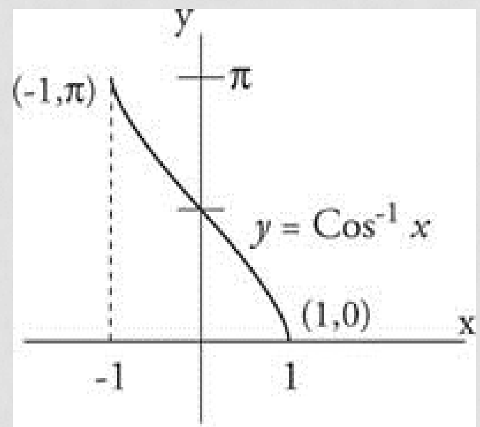
The restricted gets the inverse treatment…



Domain: $0 \leq x \leq \pi$

Range: $-1 \leq y \leq 1$

So that we can get the inverse cosine function

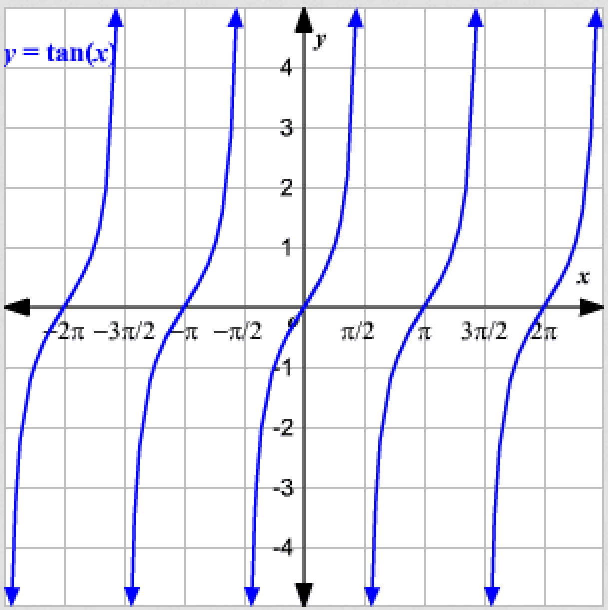


Domain: $-1 \leq x \leq 1$

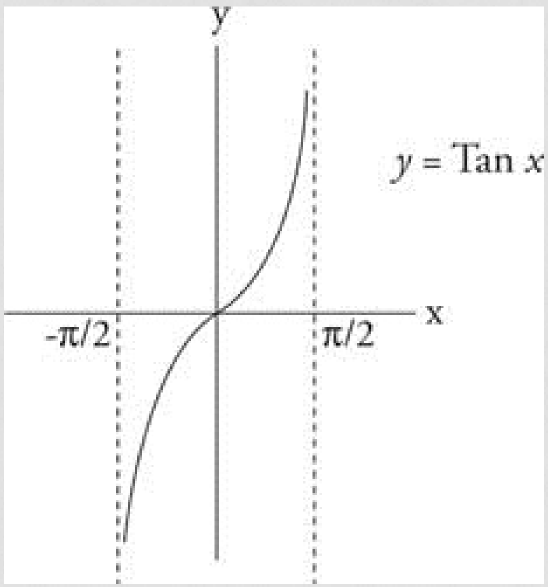
Range: $0 \leq y \leq \pi$

THE TANGENT FUNCTION

The original, not 1-1

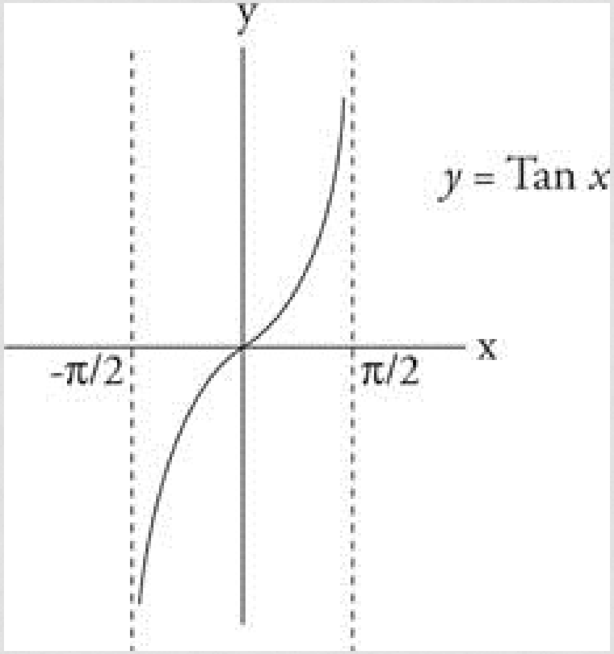


Make it 1-1

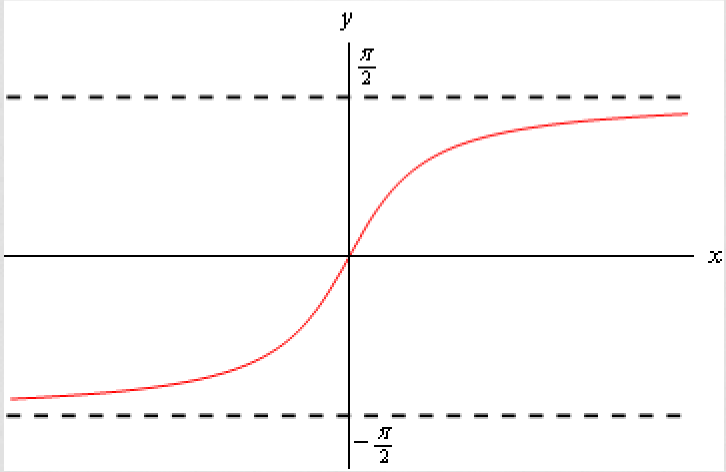


INVERSE TANGENT FUNCTION

The restricted gets "inversed."



To become



DEFINITIONS OF THE INVERSE TRIGONOMETRIC FUNCTIONS

- $y = arcsinx = sin^{-1}x$ if and only if $siny = x$
  - Domain: $-1 \leq x \leq 1$
  - Range: $-\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$
- $y = arccosx = cos^{-1}x$ if and only if $cosy = x$
  - Domain: $-1 \leq x \leq 1$
  - Range: $0 \leq y \leq \pi$
- $y = arctanx = tan^{-1}x$ if and only if $tany = x$
  - Domain: $-\infty < x < \infty$
  - Range: $-\frac{\pi}{2} < y < \frac{\pi}{2}$