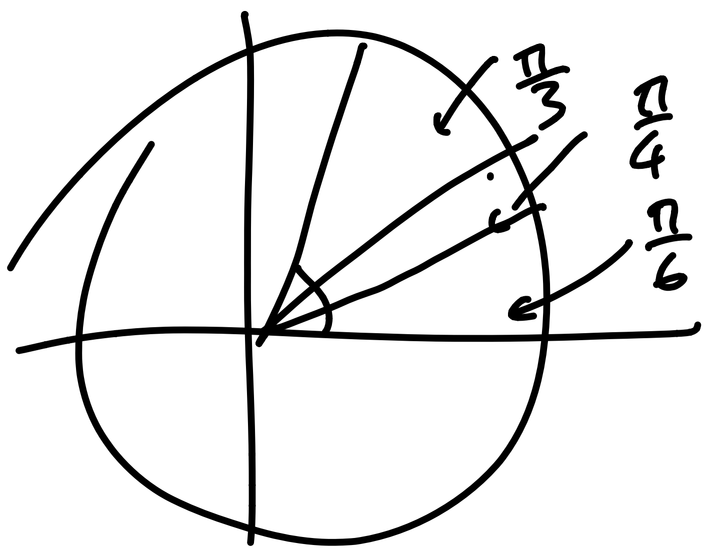
20 Inv. circular functions

Solve: $\sin x = \frac{\sqrt{3}}{2}$

$\cos(x) = \frac{1}{2}$

Recall: $\sin\left(\frac{\pi}{3}\right) = \frac{\sqrt{3}}{2}$ from standard table.



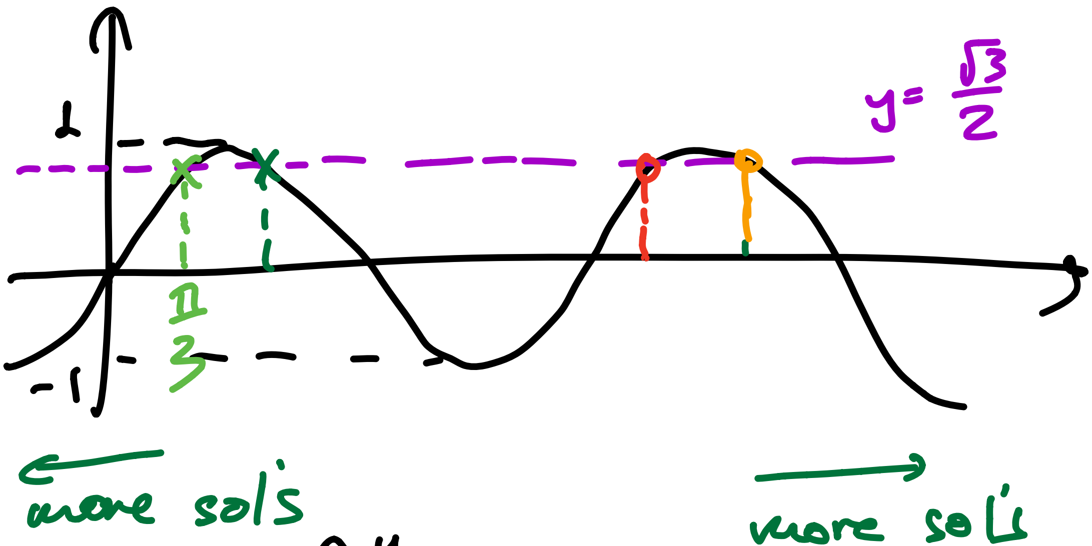
$\frac{1}{2}, \frac{\sqrt{2}}{2}, \frac{\sqrt{3}}{2}$

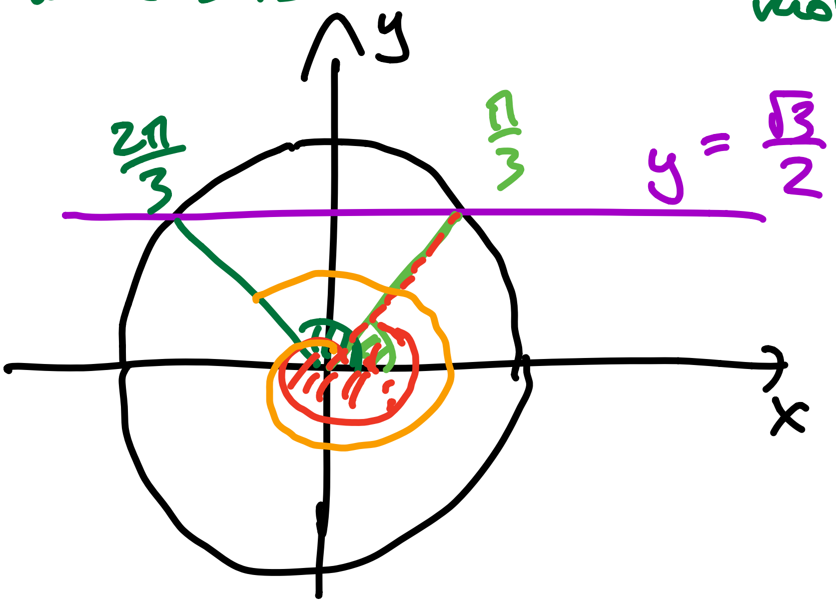
$\longrightarrow$ increasing

Q: Are there other solutions?

$\sin(x) = 0.327$

Graphically: $\sin(x) = \frac{\sqrt{3}}{2}$





Recall: let $y = f(x)$. to make sense of inverse function, need f to be 1-1.

In particular:

$f(x) = c$ can't have more than 1 solutions

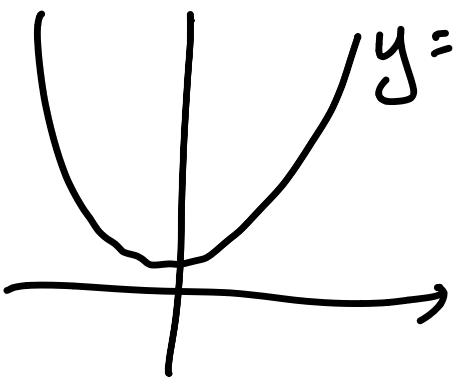
Or: any horizontal line

can't meet graph of f more than once.

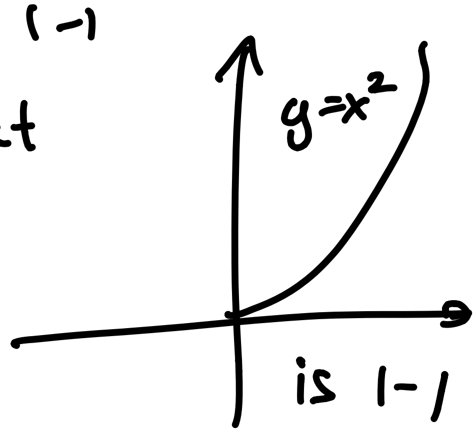
$\sin(x)$ <u>not</u> 1-1

same reasons: $\cos(x)$, $\tan(x)$ <u>not</u> 1-1 either.

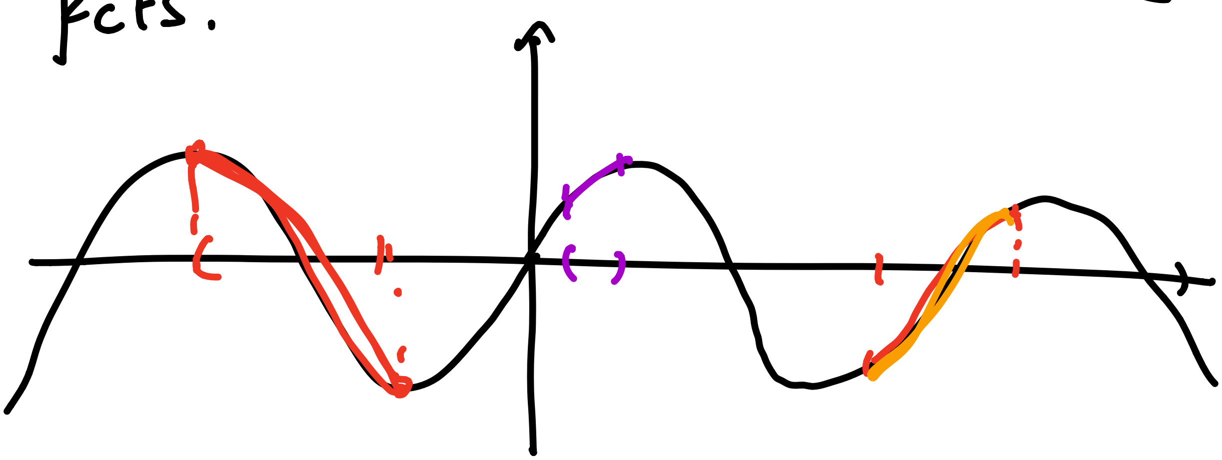
Restrict domain like we did with



but



to make sense of inverse trig fcts.



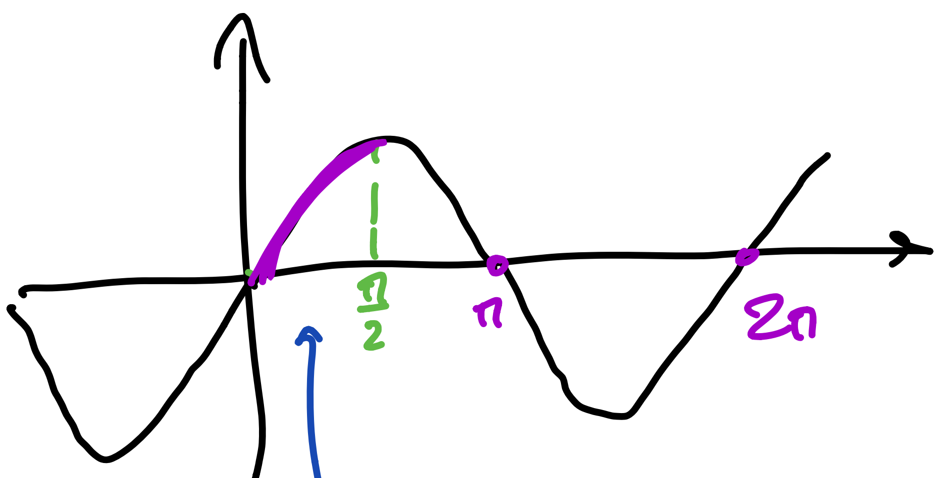
Many options on what domain to choose.

Agree on a choice:

→ Make sure that $[0, \frac{\pi}{2}]$ is in domain.

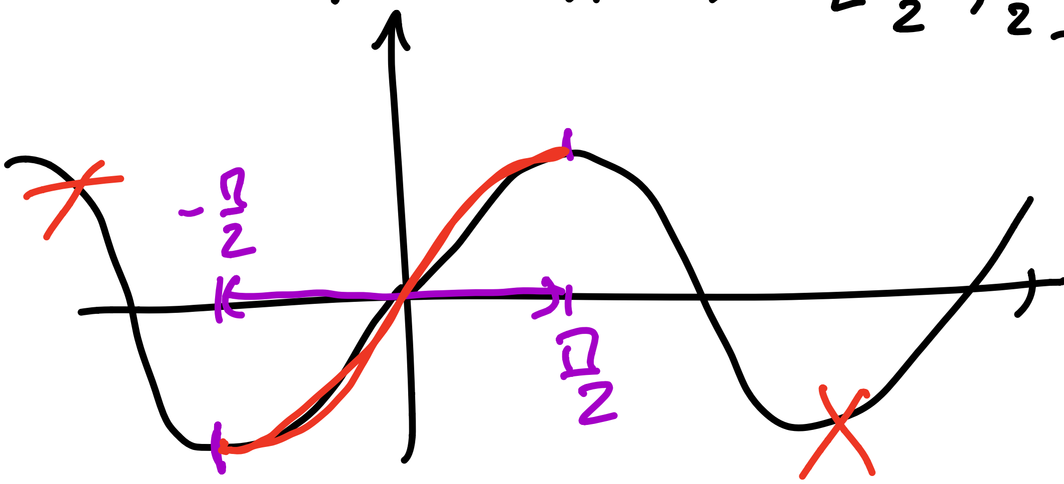
(those angles correspond to acute angles that have geometric meaning.)

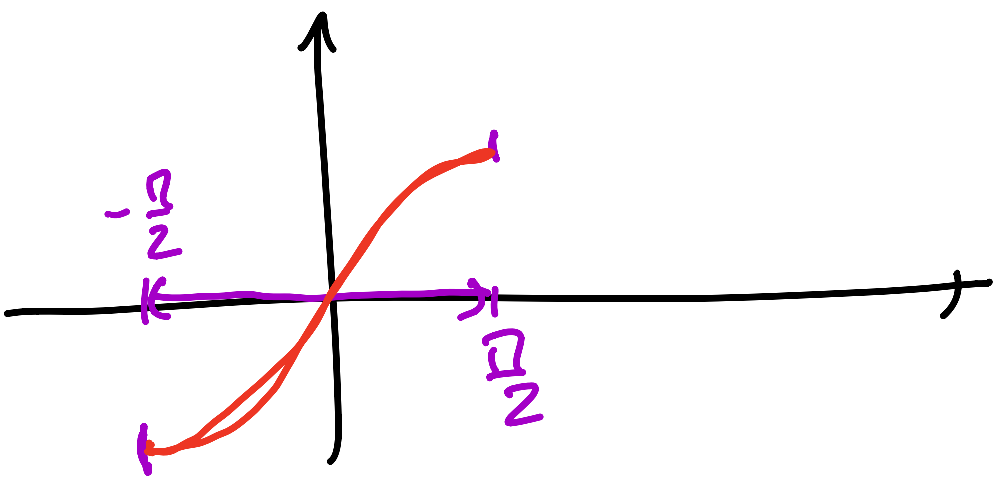
→ We want our range to be the full range of $\sin(x)$, so $[-1, 1]$



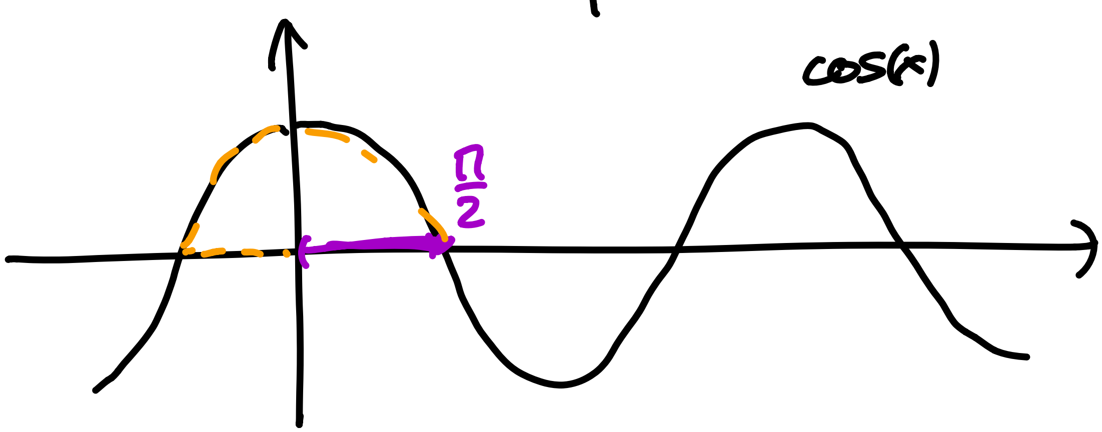
only hitting $[0,1]$ if we restrict the domain to $[0, \frac{\pi}{2}]$

The best domain to work with for sin is $[-\frac{\pi}{2}, \frac{\pi}{2}]$





Same idea for cos(x)



If we do $[\frac{\pi}{2}, \frac{\pi}{2}]$ we're not 1-1!

Instead do $[0, \pi]$ - $[0, \frac{\pi}{2}]$ is in ✓

- entire range is achieved ✓