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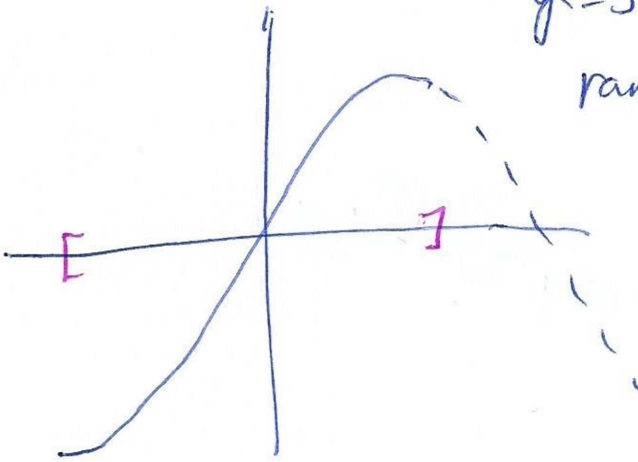


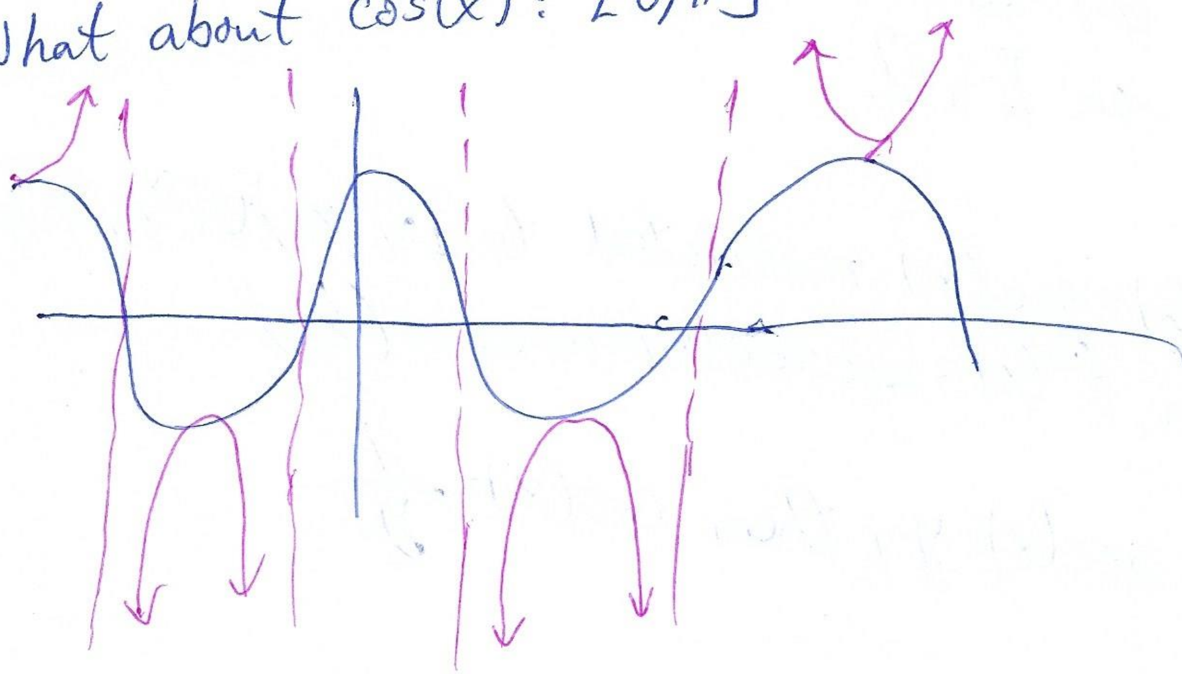
$y = \sin(x)$

range: $[-1, 1]$

Q: What should we ~~do~~ restrict the domain of $\sin(x)$ to in order to define an inverse?

$[-\pi/2, \pi/2]$

Q: What about $\cos(x)$? $[0, \pi]$



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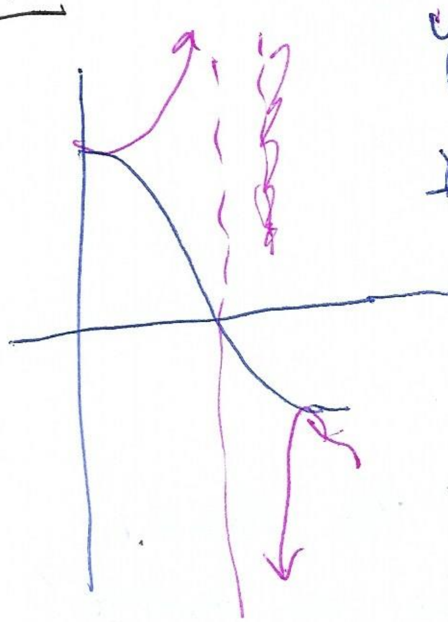

$y = \sec(x)$

~~range: [~~

range: $(-\infty, -1] \cup [1, \infty)$

If $f(x) = \sin(x)$ restricted to $[-\pi/2, \pi/2]$, then
$f^{-1}(x) = \arcsin(x) = \sin^{-1}(x)$
on $[-1, 1]$.

If $f(x) = \sec(x)$ restricted to $[0, \pi/2) \cup (\pi/2, \pi]$,
then $f^{-1}(x) = \text{arcsec}(x) = \arccos(1/x)$

If $\sec(x) = y$, then $\cos(x) = \frac{1}{y}$

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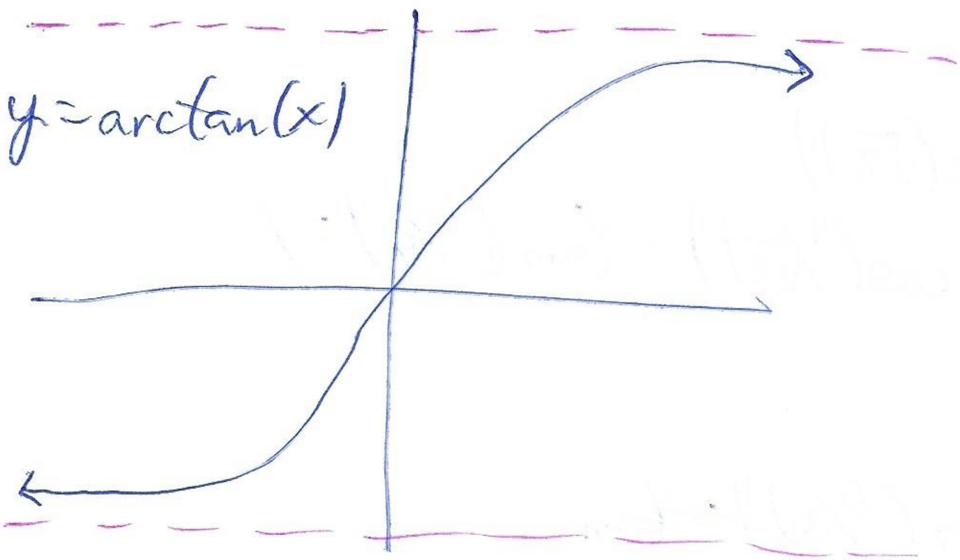
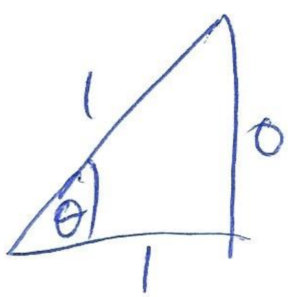
$$\operatorname{arccot}(x) = \begin{cases} \arctan(x) & \text{if } x > 0 \\ \pi + \arctan(1/x) & \text{if } x < 0 \\ \pi/2 & \text{if } x = 0 \end{cases}$$

$$\operatorname{arccot}(x) = \pi/2 - \arctan(x)$$



Ex: $\sin(\arctan(0)) = \sin(0) = 0$



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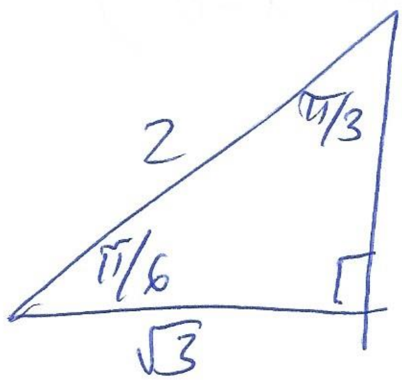
Ex: $\arcsin(\cos(\pi/6))$

$= \arcsin(\sqrt{3}/2) = \pi/3$



Ex: $\tan(\text{arcsec}(\sqrt{2}))$

$= \tan(\arccos(1/\sqrt{2})) = \tan(\pi/4) = 1$

Ex: $\arcsin(\sin(\pi/3))$ ~~= tan~~

$= \arcsin(\sin(-\pi/3)) = -\pi/3$