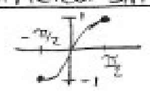
11.1 Defining the Inverse Trigonometric Functions

Problem 0) • Restricted domains of the trig fncns. no trig fncn is 1:1

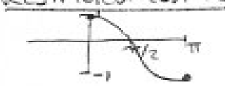
- must restrict domains to make 1:1

Restricted Sine



Domain $[-\frac{\pi}{2}, \frac{\pi}{2}]$
Range $[-1, 1]$

Restricted Cosine



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

Restricted tangent

Domain $[-\frac{\pi}{2}, \frac{\pi}{2}]$
Range $(-\infty, \infty)$

Restricted Secant

Domain $[0, \frac{\pi}{2}) \cup (\frac{\pi}{2}, \pi]$
range $(-\infty, -1] \cup [1, \infty)$

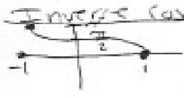
• Definitions of the inverse of trig fncns

Notations: $\sin^{-1} x$, $\cos^{-1} x$, $\tan^{-1} x$, and $\sec^{-1} x$
(aka. arcsin x, arccos x, arctan x, and arcsec x)

Inverse Sin

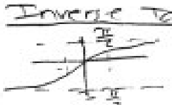
Domain $[-1, 1]$
Range $[-\frac{\pi}{2}, \frac{\pi}{2}]$

Inverse Cos



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

Inverse Tangent



Domain $(-\infty, \infty)$
Range $(-\frac{\pi}{2}, \frac{\pi}{2})$

Inverse secant

Domain $(-\infty, -1] \cup [1, \infty)$
Range $[0, \frac{\pi}{2}) \cup (\frac{\pi}{2}, \pi]$

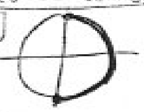
• Calculating values of inverse trig fncns

"$\sin^{-1} x$" is the # in $[-\frac{\pi}{2}, \frac{\pi}{2}]$ whose sine is x

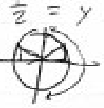
Note that "$\sin^{-1} y$" represents an #

Restricted domain of sine

$[-\frac{\pi}{2}, \frac{\pi}{2}]$



If $\sin^{-1} \frac{1}{2} = y$ than ?



not this side

so $\sin^{-1} \frac{1}{2} = 30°$ or $\frac{\pi}{6}$ ✓

Restricted Cos

$\cos \theta = 0$ is θ terminates at $\frac{\pi}{2}$ or $-\frac{\pi}{2}$ / $\theta = \frac{\pi}{2}$ is the only # in $[0, \pi]$ whose cosine is 0

ex) $\tan^{-1}(-\sqrt{3})$

$\tan(\tan^{-1}(-\sqrt{3})) = \tan \theta$

$\tan \theta = -\sqrt{3}$ ... - # must be $-\frac{\pi}{3}$