

**MAT 137**  
**Tutorial #8– Inverse trigonometric functions**  
**November 19–20, 2018**

Recall that the following two functions

$$\begin{aligned}y &= \sin x, & \frac{-\pi}{2} &\leq x \leq \frac{\pi}{2} \\x &= \arcsin y, & -1 &\leq y \leq 1\end{aligned}$$

are inverses of each other. This implies:

$$\begin{aligned}\sin(\arcsin u) &= u & \text{for all } -1 \leq u \leq 1, \\ \arcsin(\sin u) &= u & \text{for all } \frac{-\pi}{2} \leq u \leq \frac{\pi}{2}.\end{aligned}$$

If you get confused, it may help to write similar expressions for all six trigonometric functions, and to draw their graphs.

1. Compute:

- (a)  $\arccos(\cos 2)$
- (b)  $\arctan(\tan 2)$
- (c)  $\arcsin(\sin 2)$

*Warning:* The three questions all have different answers.

2. Sketch the graph of the following functions.

- (a)  $f(x) = \sin(\arcsin x)$
- (b)  $f(x) = \arcsin(\sin x)$
- (c)  $f(x) = \tan(\arctan x)$
- (d)  $f(x) = \arctan(\tan x)$

*Warning:* The four graphs are all different.

3. Find formulas for the following expressions, using rational functions and roots (if necessary). Write the values of  $x$  for which is formula is valid.

- (a)  $\arccos(\sin x) =$
- (b)  $\sec(\arccos x) =$
- (c)  $\sin(\arccos x) =$
- (d)  $\sin(\arctan x) =$
- (e)  $\cot(\operatorname{arcsec} x) =$