# MAT 137
# Tutorial #6– Inverse trigonometric functions
# November 14–15, 2016

Recall that the following two functions

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

are inverses of each other. This implies:

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

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) $\cot(\text{arcsec} x) =$