

- Assignment #4 due on November 26
- Test 2 opens on December 4
- Assignment #5 due on December 20

- TODAY: Inverse trigonometric functions

- WEDNESDAY: Local extrema
 - **Watch videos 5.2, 5.3, 5.4**
 - Supplementary video: 5.1

Definition of arctan

1. Sketch the graph of \tan .
2. Prove that \tan is not one-to-one.
3. Select the largest interval containing 0 such that the restriction of \tan to it is one-to-one. We define \arctan as the inverse of this restriction. Let $x, y \in \mathbb{R}$

$$\arctan y = x \quad \iff \quad ???$$

4. What is the domain of \arctan ? What is the range of \arctan ? Sketch the graph of \arctan .
5. Compute
 - 5.1 $\arctan(\tan(1))$
 - 5.2 $\arctan(\tan(3))$
 - 5.3 $\arctan\left(\tan\left(\frac{\pi}{2}\right)\right)$
 - 5.4 $\arctan(\tan(-6))$
 - 5.5 $\tan(\arctan(0))$
 - 5.6 $\tan(\arctan(10))$

Find simple expressions for these quantities and state the domain on which they are valid:

1. $\sin(\arccos x)$

3. $\sec(\arctan x)$

2. $\sec(\arccos x)$

4. $\tan(\operatorname{arcsec} x)$

Hint: There are two standard ways to attack these problems:

- Use a trig identity
e.g.: a trig identity relating \sin and \cos for (1)
- Or draw a right triangle with side lengths 1 and x
e.g.: with an angle θ such that $\cos \theta = x$ for (1)

If you need to take a square root, you must justify which branch (+ or $-$) you are choosing.