Today: Inverse trig functions.

Then: Reading Week!

Homework: before Tuesday’s class after the Reading Week watch videos 5.2, 5.3, 5.4, as well as 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 \( \arctan (\tan (\frac{\pi}{2})) \) 
   5.4 \( \arctan (\tan (-6)) \) 
   5.5 \( \tan (\arctan (0)) \) 
   5.6 \( \tan (\arctan (10)) \)
Obtain (and prove) a formula for the derivative of arctan.

*Hint:* Differentiate the identity

$$\forall t \in \ldots \quad \tan(\arctan(t)) = t$$
Compute the derivative of

\[ f(x) = 2x^2 \arctan(x^2) - \ln(x^4 + 1) \]

and simplify it as much as possible.
Practice!

Find the derivatives:

\[(\arccos x)' = ?\]

\[(\arccot x)' = ?\]