Today: Inverse trig functions.

Homework before Friday’s class: watch videos 5.1, 5.2, 5.3, 5.4.
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 $x, y \in \mathbb{R}$.

   \[ \arctan y = x \iff ??? \]

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.
“How I need a drink, alcoholic of course, after the heavy lectures involving quantum mechanics...” (c) Sir James Hopwood Jeans
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This is a mnemonic for $\pi = 3.14159265358979...$
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This is a mnemonic for $\pi = 3.14159265358979...$

“How I need a drink, alcoholic of course, after the heavy lectures involving vicious Calculus!” (c) Boris Khesin