

HW Assignment for Ch. 3.10, 3.11 and 4.1

Due Wednesday, May 29, 2019. Quiz 6 on May 29 will have problems similar to these.

During lecture on 5/20 we proved that $\frac{d}{dx}[\sin^{-1} x] = \frac{1}{\sqrt{1-x^2}}$ by using using implicit differentiation to differentiate $\sin y = x$ and then simplified the result using a right triangle. The purpose of this assignment is to understand this proof and then apply the same idea to derive differentiation rules for three other inverse trig functions. A secondary purpose of this assignment is to practice communicating mathematical ideas using proper notation.

1. Neatly reproduce the proof that $\frac{d}{dx}[\sin^{-1} x] = \frac{1}{\sqrt{1-x^2}}$ following the lecture notes. Include enough detail so that if one of your classmates missed lecture that day, they would be able to read your proof and understand each step.
2. Using implicit differentiation and right triangles, derive the following rules for the remaining three inverse trig functions. For each rule, show the work of doing the implicit differentiation and draw the appropriate triangle with each side labelled.

$$(a) \frac{d}{dx}[\cot^{-1} x] = -\frac{1}{1+x^2}$$

$$(b) \frac{d}{dx}[\sec^{-1} x] = \frac{1}{|x|\sqrt{x^2-1}}$$

$$(c) \frac{d}{dx}[\csc^{-1} x] = -\frac{1}{|x|\sqrt{x^2-1}}$$

For the ORANGE edition, do

- **3.11:** 11, 15, 17, 19, 29, 31, 35, 36, 41
- **4.1:** 11, 15, 17, 23, 31, 35, 43, 51, 53, 57

For the BLUE edition, do

- **3.11:** 5, 9, 11, 13, 28, 29, 23, 27, 37
- **4.1:** 11, 15, 17, 23, 29, 33, 37, 41, 43, 47