

This Worksheet will be collected at the end of your recitation section on **Thursday, Sep 22nd**. Note that this week's worksheet is a bit shorter to give you time to review for our exam this Friday. I suggest you use the extra recitation time to work on problems from the review packet.

3.5. Derivatives of Trigonometric Functions

1. Use the limit definition of the derivative to show that

$$\frac{d}{dx}(\cos x) = -\sin x.$$

You will need the following limits we discussed in class

$$\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1 \text{ and } \lim_{x \rightarrow 0} \frac{\cos(x) - 1}{x} = 0.$$

2. Prove any one of the following

$$\frac{d}{dx}(\tan x) = \sec^2 x,$$

$$\frac{d}{dx}(\cot x) = -\operatorname{csc}^2 x,$$

$$\frac{d}{dx}(\sec x) = \sec x \tan x,$$

$$\frac{d}{dx}(\operatorname{csc} x) = -\operatorname{csc} x \cot x.$$

(Hint: first rewrite these trigonometric functions in terms of sine and cosine, then use our differentiation rules).

3. Compute the following.

a) $\frac{d}{dx} \left(\frac{\sin^2(x) + 1}{\tan(x)} \right)$

b) $\frac{d}{dx} \left(\sqrt{x} \sec(x) + \frac{\sin(x)}{x} \right)$

Questionnaire:

Below are a few questions which are completely optional, and are meant to benefit you. Please only fill out what you feel comfortable with.

1. Is there anyone in class that you'd like to be grouped with next week?

2. Did you feel you worked well with your group this week?

3. Any other comments?

Grading Rubric:

Attendance: /20

Participation: /20

Completeness: /60