

Derivatives of Trigonometric Functions (3.5)

Expected Skills.

At the end of this section, students will be able to:

- compute the derivative of trigonometric functions ($\sin x$, $\cos x$, $\tan x$).

Note: We will focus only on the derivatives of $\sin x$, $\cos x$ and $\tan x$. Indeed, the derivatives of $\sec x$, $\csc x$ and $\cot x$ can be found from there. We thus don't talk about it.

Pre-Class Activity (ch3-derivatives-3-trig-1-pc). The goal of this pre-class activity is to have the students compute $\lim_{h \rightarrow 0} \frac{\cos h - 1}{h}$ as it is used to compute the derivatives of $\sin x$ and $\cos x$ (cf. class activity below).

Worksheet (ch3-derivatives-3-trig-2-ws). The first part of the activity is to have the students make an “educated” guess about the derivative of $\sin x$.

In the second part, we actually prove the formula and in the third part have the students compute the derivative of $\tan x$.

The fourth part is composed of “mechanical” exercises using these derivatives. The fifth part is a simple application.

Supplemental Activity. The goal of this activity is to have the students derive the derivative of the sine and cosine functions using the squeeze theorem and other derivative rules. It is suggested that the instructor use one as a student exercise and the other as a board problem. This activity would also be useful to begin discussions about derivatives of other trigonometric functions.