

Section 2.6 Derivative of Trigonometric Functions

Some Important Trigonometric Limits To be able to calculate the derivative of the trig functions we need to be able to evaluate :

$$(\sin(\theta))' = \lim_{h \rightarrow 0} \frac{\sin(\theta + h) - \sin(\theta)}{h}$$

$$(\cos(\theta))' = \lim_{h \rightarrow 0} \frac{\cos(\theta + h) - \cos(\theta)}{h}$$

First let's recall couple of facts about the limits of trig functions from Chapter 1.

1) $\lim_{\theta \rightarrow 0} \sin(\theta) = 0$ and

2) $\lim_{\theta \rightarrow 0} \cos(\theta) = 1$

These facts follows from the fact that sine and cosine are continuous functions.

We will start evaluating the limit for the derivative of the sine function at $\theta = 0$

$$(\sin(0))' = \lim_{h \rightarrow 0} \frac{\sin(0 + h) - \sin(0)}{h} = \lim_{h \rightarrow 0} \frac{\sin(h)}{h} = \frac{0}{0}$$

So this limit is indeterminate form. In your exam 1 you have been told that this limit is equal to 1. Now using geometry we will first prove this fact.