

Lecture 3: Worksheet

We study a few limits.

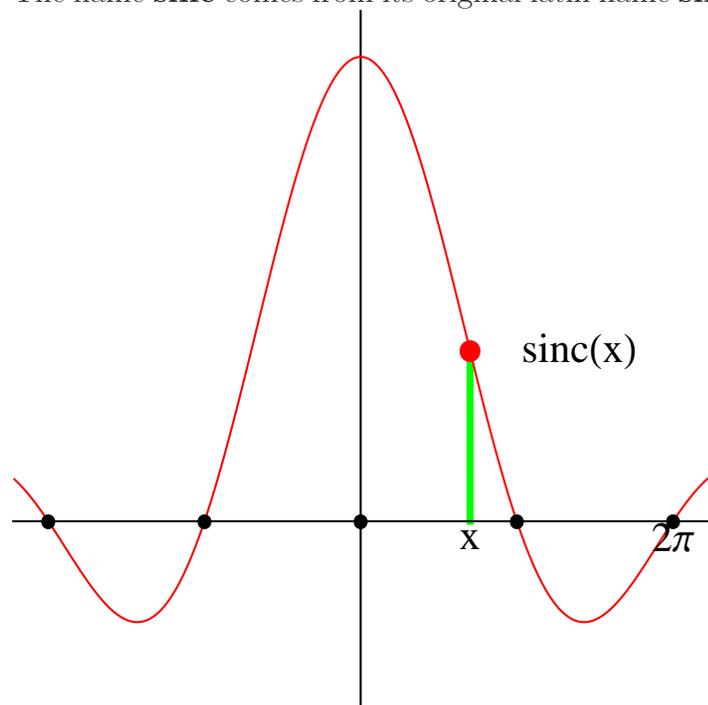
The Sinc function

A prototype function for studying limits is the sinc function

$$f(x) = \frac{\sin(x)}{x}.$$

It is an important function and appears in many applications like in the study of waves or signal processing (it is used in low pass filters).

The name **sinc** comes from its original latin name **sinus cardinalis**.



1 Does the function $\frac{\cos(x)}{x}$ have a limit at $x \rightarrow 0$?

2 Does the function $\frac{\sin(x^2)}{x^2}$ have a limit for $x \rightarrow 0$?

3 Does the function $\frac{\sin(x^2)}{x}$ have a limit for $x \rightarrow 0$?

4 Does the function $\frac{\sin^2(x)}{x^2}$ have a limit for $x \rightarrow 0$?

5 Does the limit $\frac{1-\cos^2(x)}{x^2}$ exist for $x \rightarrow 0$?

6 Does the function $\frac{x}{\sin(x)}$ have a limit for $x \rightarrow 0$?

7 Does the function $\frac{\sin(x)}{|x|}$ have a limit for $x \rightarrow 0$?

8 Does the function $\frac{\sin(x)}{\sqrt{|x|}}$ have a limit for $x \rightarrow 0$?