

# INTRODUCTION TO CALCULUS

MATH 1A

## UNIT 4: WORKSHEET

**Problem 1:** Does the function  $\frac{\cos(x)}{x}$  have a limit at  $x \rightarrow 0$ ? If yes, what is it? If not, why does the limit not exist?

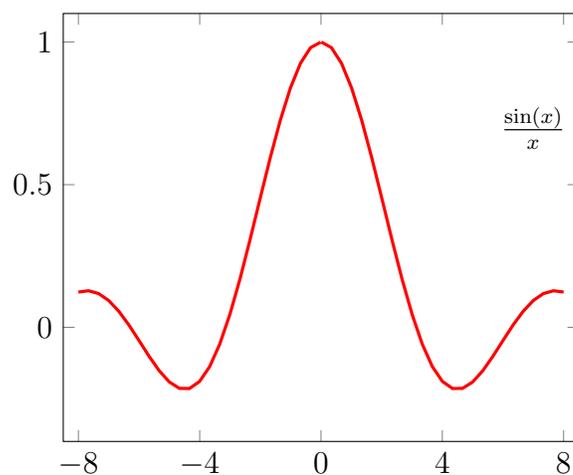
**Problem 2:** Does the function  $\frac{\sin(x)}{e^x}$  have a limit at  $x \rightarrow 0$ ? If yes, what is it? If not, why does the limit not exist?

**Problem 3):** A prototype function for studying limits is the sinc function

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

At which points can you be sure that the function has a limit? We will investigate the limiting behavior in class theoretically.

**Problem 4):** First some experiment. Lets look at the graph of the function



If you look at the graph, does it appear that the function has a left or/and right limit everywhere?

**Problem 5:** Now that you know the answer to  $\lim_{x \rightarrow 0} \sin(x)/x$ , find the  $\lim_{x \rightarrow 0} \frac{\sin(x^2)}{x^2}$ .

**Problem 6:** Does the function  $\frac{\sin(x^2)}{x}$  have a limit for  $x \rightarrow 0$ ?

**Problem 7:** Does the function  $\frac{\sin(x)}{x^2}$  have a limit for  $x \rightarrow 0$ ?

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

**Problem 9:** Does the function  $\frac{\sin(x)}{|x|}$  have a limit for  $x \rightarrow 0$ ?

**Problem 10:** Does the function  $\frac{x}{|x|}$  have a limit for  $x \rightarrow 0$ ?