

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?

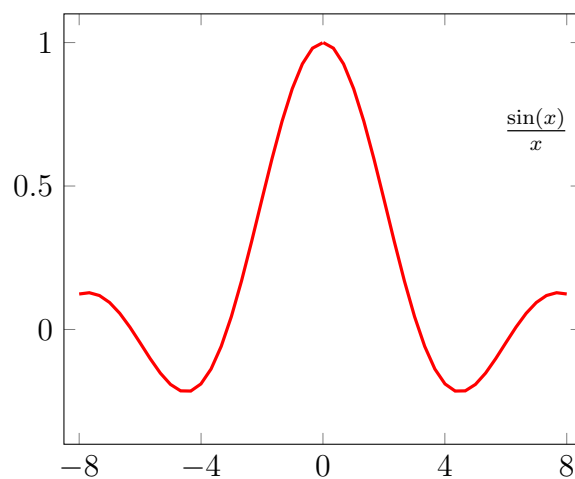
Problem 2: Does the function $\frac{\sin(x)}{e^x}$ have a limit at $x \rightarrow 0$? If yes, what is it? If not, why does the limit not exist?

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 $x \rightarrow 0$?