Rohit Wason
Spring 2021

Math 501 Homework (§4.2 Limit Theorems)

Problem 1. Show that $\lim_{x\to 0}(\frac{\sin x}{x}) = 1$.

Solution. We start with observing that $\sin x < x < \tan x$ for $0 < x < \pi/2$. Dividing all parts by $\sin x$,

$$1 < \frac{x}{\sin x} < \frac{1}{\cos x}$$
$$\cos x < \frac{\sin x}{x} < 1$$

Since $\lim_{x\to 0}(1) = \lim_{x\to 0}(\cos x) = 1$, by **Squeeze therem** we have that

$$\lim_{x\to 0}(\frac{\sin x}{x}) = 1$$

□