MATH 250 **Name:**
Homework 4, Spring 2023

I have neither given nor received unauthorized assistance on this assignment.

Homework 4 has questions 1 through **??** with a total of **??** points. For this assignment, *neatly handwrite* your work on your own paper, digitize it, and upload it to Canvas.

5 1. Without explicitly using $\neg$, write the negation of

$$(\forall\ x \in \mathbf{R})\left(\exists\ y \in \mathbf{R}\right)\left(|x| < |y|\right).$$

5 2. Show that the statement

$$(\forall\ x \in \mathbf{R})\left(\exists\ y \in \mathbf{R}\right)\left(|x| < |y|\right).$$

is false by showing that its negation is true.

5 3. Show that the statement

$$(\ L \in \mathbf{R})\,(\exists\ m \in \mathbf{R})\,(\forall\ x \in \mathbf{R})\left(\frac{x+9}{x+11} < L\right)$$

is true.

5 4. Given that the statement

$$(\forall\ x \in \mathbf{R})\,(|\sin(x)| \leq 1)$$

is true, show that

$$(\exists\ m \in \mathbf{R})\,(\forall\ x \in \mathbf{R})\,(|\sin(x) + x| \leq m|x|)$$