Tufts University
Department of Mathematics

Math 136 **Class work for the Week of January 23, 2023** [1] **Spring, 2023**

Due date: upload to gradescope by 11:59 pm two days after this is handed out

Every week we plan to work in small groups of about four students to learn to write proofs and to solve problems. I will grade each group's work.

- *Scribe:* each week, someone in the group will volunteer to submit to Gradescope the group's answer *along with group member names.* This role should rotate through the group.
- *Respect:* when discussing problems, please make sure that everyone feels comfortable speaking and that all feedback is supportive and encouraging.
- Please keep your group name so you can rejoin the same group each week.

Problem 1 The toll ticket taker notices that I took 2 hours to drive 150 miles on the Mass Pike, which has a speed limit of 70 mph. Why can they give me a ticket for going 75 mph at least once on the trip?

Problem 2 Let $f : \mathbb{R} \to \mathbb{R}$ be differentiable on $\mathbb{R}$. Assume $f'(x) < 1$ for all $x \in \mathbb{R}$ and $f(0) = 1$.

(a) Prove that $f(x) < 1 + x$ for all $x > 0$.

(b) What can you say about $f(x)$ for $x < 0$?