MATH 3122A FALL 2023 HOMEWORK ASSIGNMENT 1

Please hand in your solutions to T. Barron on or before Wednesday September 20 (10:30 am)

Problem 1. Show that there is no function

$$f : \mathbb{R} \to \mathbb{R}$$

such that

$$f'(x) = \begin{cases} -1, \text{ if } x < 0 \\ 0, \text{ if } x = 0 \\ 1, \text{ if } x > 0 \end{cases}$$

for all x.

Problem 2. *Use the standard mean value theorem* to prove the following "mean value theorem for integrals".

Let f be a continuous real valued function on the interval $[a, b]$, where $a < b$. Then there is $c \in (a, b)$ such that

$$\int_a^b f(x)dx = f(c)(b - a).$$