Mathematics 1110H – Calculus I: Limits, Derivatives, and Integrals
TRENT UNIVERSITY, Summer 2023 (S61)

Quiz #9
Mostly calculus without calculus![†]
Due[*] *just before midnight on Thursday, 1 June.*

Please show all your work when answering the questions below.

1. Use you knowledge of calculus to compute $\displaystyle\int_0^{\pi} \sin(x)\,dx$. *[3]*

2. Without using any more calculus, use the result of **1** to help you compute the integral $\displaystyle\int_0^{2\pi} 2\sin\left(\frac{x}{2}\right)\,dx$. *[3]*

Hint: The region given by $0 \le y \le 2\sin\left(\frac{x}{2}\right)$, for $0 \le x \le 2\pi$, can be obtained by stretching the region given by $0 \le y \le \sin(x)$, for $0 \le x \le \pi$.

3. Sketch the region given by $-\sin(x) \le y \le 2\sin\left(\frac{x}{2}\right)$, for $0 \le x \le 2\pi$. *[1]*

4. Without using any more calculus, use the knowledge you have gained from **1**–**3** to help you compute the area of the region in **3**. *[3]*

[†] As Bruce Lee is supposed to have described his approach to martial arts, "It's the art of fighting without fighting."

[*] You should submit your solutions via Blackboard's Assignments module, preferably as a single pdf. If this fails, you may submit your work to the instructor on paper or by email to `sbilaniuk@ trentu.ca` .