Calculus 1, Handwritten Homework 1 — Spring 2022

NAME _____ STUDENT NUMBER _____

Write in complete sentences and use correct notation (such as equal signs). Give justifications for your claims using the definitions and theorems in the notes and book (quote them by name or number, as is done in the examples in the notes and videos, and in the solutions posted online). Give precise values, not numerical (calculator) approximations. If provided, put your final answer in the box. Each numbered problem is worth 5 points. Print out this document, work the problem, scan your solutions, and submit the scan of (in PDF) to the D2L DropBox by the deadline. See the online syllabus for deadlines. **Do not copy work from others or from the internet! This will result in you being charged with academic misconduct.**

1. Prove for any real numbers a and b that $|ab| = |a|\,|b|$. This is Exercise 25 in Appendix A.1. HINT: Consider four cases based on the signs of a and b, and use the definition of the absolute value function.

2. Use the Axiom of Completeness to define the real number $\sqrt{2}$. Explain how you know $\sqrt{2}$ exists using upper bounds and least upper bounds. HINT: Concentrate on pages 3 and 4 of the online notes for Section A.6. This one is tricky, but do your best.

3. Find the average rate of change of $f(x) = \cos(2x) - \log 8$ on the interval $[0, \pi/2]$.