

Calculus 1, Handwritten Homework 3 — 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. Consider the following one-sided limits. If the one-sided limits do not exist, then explain why. If they do exist then find their values. Use the FCS method described in the notes and videos. Quote theorems from the section (applied to one-sided limits) and make sure to use Dr. Bob's Limit Theorem (applied to one-sided limits). This is Exercise 18 in Section 2.4.

(a) $\lim_{x \rightarrow 1^+} \frac{\sqrt{2x}(x-1)}{|x-1|}.$

(b) $\lim_{x \rightarrow 1^-} \frac{\sqrt{2x}(x-1)}{|x-1|}.$

2. Evaluate $\lim_{x \rightarrow 0} \frac{x^2 - x + \sin x}{2x}$. Quote theorems from the section and make sure to use Dr. Bob's Limit Theorem. This is Exercise 32 in Section 2.4.



3. Consider the piecewise defined function $f(x) = \begin{cases} x & \text{if } x \in (-\infty, 1) \\ 0 & \text{if } x = 1 \\ x^2 & \text{if } x \in (1, \infty). \end{cases}$ Is f continuous at $x = 1$?
- Use The Continuity Test and justify claims you make about limits.

