

Mathematics 1110H – Calculus I: Limits, Derivatives, and Integrals

TRENT UNIVERSITY, Summer 2026 (S62) [reading course]

Assignment #1

*Due on Friday, 26 June.**

Please take a peek at what is in the *SageMath Resources* section of the *Course Content* page on the MATH 1110H Blackboard site. At the very least, read the handout *Getting Started with sage.trentu.ca*, and skim through the parts of Chapter 1 of *Sage for Undergraduates*, by Gregory Bard, that have to do with plotting graphs. Check out §4.8 of the book for how to compute limits using SageMath.

1. Use SageMath to plot each of the functions in **a–g** for $-2\pi \leq x \leq 2\pi$. [$7 = 7 \times 1$ each]
 - a. $a(x) = \sin(x)$
 - b. $b(x) = x \sin(x)$
 - c. $c(x) = \sin(x^2)$
 - d. $d(x) = x^2 \sin(x^2)$
 - e. $e(x) = \sin\left(\frac{1}{x}\right)$
 - f. $f(x) = x \sin\left(\frac{1}{x}\right)$
 - g. $g(x) = \frac{1}{x} \sin(x)$
2. Each of the functions in parts **e–g** of question 1 above is undefined at $x = 0$. For each of these three functions, use SageMath to compute the limit of the function as x approaches 0, if said limit exists, and then explain (informally!) why this limit is what it is, or why it doesn't exist. [$3 = 3 \times 1$ each]

Hint. Look at their graphs.

[Total = 10]

On Problems

Our choicest plans
have fallen through,
our airiest castles
tumbled over,
because of lines
we neatly drew
and later neatly
stumbled over.

A “grook” by Piet Hein.

* You should submit your solutions via Blackboard's Assignments module, preferably as a single pdf. If that fails, please submit directly to the instructor on paper or via email to sbilaniuk@trentu.ca. You may work with others, use whatever tools you like, and look things up, so long as you write up your submission by yourself and give due credit to your collaborators and any tools or sources you actually used.