

Math 111.17 Fall 2002
Assignment #0

This assignment is due at the beginning of class on Tuesday, September 3, 2002. You must submit all problems that are marked with an asterisk (*). **YOUR ASSIGNMENT MUST BE STAPLED. UNSTAPLED ASSIGNMENTS WILL NOT BE ACCEPTED!**

1. * Send me an email which includes your name, your hometown, your anticipated major, and your solution to problem 9. Also answer the following two questions: Why are you taking this course? and How do you feel about math? (Be honest!)
2. Read all of the course policies, including “Words of Wisdom.” Visit and explore the Math 111 course website and our Section 17 home page.
3. Read “To the Student” on page xvii of Stewart.
4. Explore the Tools for Enriching Calculus CD that is included with your textbook. Find out about its modules and homework hints. See if there are any hints for the exercises assigned in problem 6 below.
5. Complete the “Basic Algebra Review” worksheet which can be downloaded and printed from our Section 17 home page. Even though the solutions are provided, you should still work through many of the exercises. This will help you to “get back into the swing of things” after a long summer off, and to help you honestly assess your high school mathematics background. If you are having much difficulty with this problem and problem 6, you should visit the Mathematics Support Center.
6. * Do the following exercises from Stewart.
 - Appendix A pages A6–A7: #17, 18, 26, 27, 30, 37, 41
 - Appendix B pages A16–A17: #11, 13, 16, 17, 23, 37, 38, 39, 43, 53
 - Appendix C pages A27–A29: #1, 4, 5, 6, 13, 15, 18, 29, 30, 40, 41, 43, 45, 48, 50
7. Read “A Preview of Calculus” on pages 3–9 of Stewart. The purpose of reading this section is twofold. It will give you some flavour for what calculus is, as well as many of the ideas we will learn this semester. More importantly, it will get you ‘reading math.’ One of the most difficult things for beginning university students is learning and retaining material written in scientific textbooks. Reading a textbook in mathematics, physics, chemistry, biology, or economics, is vastly different than reading an English, history, political science, philosophy, or sociology textbook. For many incoming students, the most challenging part of the transition from high school is learning how to learn from difficult and technical sources. The investment of time and effort now will pay off in the next four years.

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8. The following two problems were seen on a previous calculus final examination. At the end of the semester you should be able to solve them, although you probably won't be able to now. It is meant to illustrate that there is more going on here than in high school calculus.

- You have been given the task of designing a number of TCAT bus shelters for the city of Ithaca. Each shelter is in the shape of a large rectangular box with a square top, no floor, and open in the front. The materials for the top cost \$20 per square foot, and the materials for the sides cost \$12 per square foot. You are allowed to spend no more than \$5000 per shelter. What dimensions should you make the shelter so that they enclose the largest possible volume? Verify that your answer is the maximum.

- Let $R_n = \sum_{j=1}^n \frac{1}{n} \ln \left(1 + \frac{j}{n} \right)$.

(a) Interpret R_n as a Riemann sum for a certain function $f(x)$ and hence evaluate $\lim_{n \rightarrow \infty} R_n$.

(b) Use the result of (a) to evaluate

$$\lim_{n \rightarrow \infty} \frac{[(n+1)(n+2)(n+3) \cdots (2n)]^{1/n}}{n}.$$

9. * Every four years the International Congress of Mathematicians (ICM) is held. The most recent congress was held last week in Beijing. In addition to being an enormous conference attended by over 3500 mathematicians from all over the world, the ICM is where the Fields Medal is presented. The Fields Medal is thus given every four years, and is the most prestigious award in mathematics. It is often called the “Nobel Prize of Mathematics,” but can only be won by people under 40 years of age.¹ Find out some history of the Fields Medal. Specifically,

- (a) Who created/envisioned the medal, and when was the first time it was awarded?
- (b) Whose bust appears on the medal?
- (c) Who are the two winners of the 2002 Fields Medal? What are their nationalities, and at which universities do they work?

One purpose of this question is to help develop your web browsing skills. There is more information about virtually every subject than one can even imagine on the internet. All you have to do is find it!

¹In the movie “Good Will Hunting” Matt Damon’s character Will Hunting is a mathematical prodigy who comes under the influence of Gerald Lambeau, a fictitious Fields medallist at MIT.