

Due Friday, May 1. You may either email me your document, or bring a hard copy to my mailbox in the math department.

This assignment is a chance for you to reflect on the bigger picture surrounding what we've been studying in this course. To receive credit, you must write a paper of approximately five pages (double-spaced, one-inch margins) on one of the topics below (or a topic of your choice, with prior approval).

This assignment is entirely optional. If you complete it, your score can partially offset one exam grade or your homework grade. You may also choose to complete an optional programming assignment for the same bonus. If you complete both the essay and the programming assignment, I will grade both and use the higher score for the grading bonus.

Topics

I may add to this list before the end of classes if I think of additional topics (or if I hear good suggestions from students). If you have a topic idea that you would like to write about, let me know, and I may allow you to write on that (and I will possibly add it to the list as well).

1. Read G. H. Hardy's *A Mathematician's Apology* (look online for a free pdf). Write a paper in which you summarize and critique Hardy's perspective on pure mathematics, especially number theory, and its usefulness (or lack thereof). Try to bring in examples from material we have covered in class.

Personal note: I find certain parts of the Apology to be way off-base and even offensive, but I've resisted the urge to tell you to only read specific sections. Hardy's views are in no way the consensus among mathematicians, but he does very eloquently express many ideas that are still quite prevalent in one form or another.

2. Write a paper describing, in a manner accessible to a non-expert, the role that prime numbers play in number theory. In your discussion, describe some of the ways that they are used in cryptography, as well as which mathematical facts underly their usefulness in that setting. State any mathematical facts in way that is complete and correct, but comprehensible. Have at least one non-expert (e.g. your roommate) read your paper to give you comments.

Effect on your course grade

Your score on the essay will factor into your final grade as 5% of the total. This 5% will be removed from one of the other four categories (homework, midterm 1, midterm 2, final), whichever will increase your course grade the most. For example, the first midterm is 20% of your final grade by default, but this may shrink to 15% to make room for your score on the essay assignment.

If this would harm your course grade, then I won't do it. You are not putting yourself at risk by attempting the assignment.