

Math 15–Discrete Structures–Project Guidelines

Overview

As the capstone project of this course, you will apply discrete mathematics to solve a practical computer science problem of your choice and write up your work in a brief technical report. In particular, you must state a focused practical problem, model the problem mathematically, solve the problem using the techniques of discrete mathematics, and interpret your solution in the original practical domain. Your project must have some clearly identified original component—literature surveys and paper reviews are not acceptable.

It is preferred, but not required, that you develop some Python code and/or Sagemath code to aid in solving and/or illustrating solutions to your problem.

Due dates

Proposal: Wendsday, April 19.

Progress Report: Wednesday, May 3.

Abstract Page: Wednesday, May 17.

Complete Final Report: Wednesday, May 24.

All items are due at the beginning of class on the day they are due. Late reports will be penalized by 10 points for each 24 hours of lateness.

Purpose

The main purpose of the project is to give you an opportunity to apply discrete mathematics to solve a practical computer science problem that fascinates you. Whereas most homework exercises are limited in scope and can be solved within a few hours, the project gives you an interesting open-ended problem to think about over a longer period of time. In addition, doing the project will help you learn how to carry out reserach and how to communicate your findings in writing.

How to pick a problem

To pick a problem it is helpful to sonders the following process. First, select a topic that fascientes your (*e.g.* cryptology, algorithms, artificial intelligence, dtatbases, graphics, computer music or gaming). Second, decide on what type of skill you wish to focus (*e.g.* counting, solving recurrences, proving theorems, estimating values). Third, find a practical problem in your topic that can be solved by your skill (*e.g.* count the number of possible keys in the Geheimschreiber cipher machine). Be sure to keep your problem highly focused and within your grasp.

Selecting a problem to solve is one of the most difficult steps in carrying out this project. Many students find it helpful to discuss their problem ideas with me or other students before embarking on the project. It is highly desirable to draw upon your life experiences in selecting your topic.