We have seen already the usefulness of using software packages when solving large scale linear programs. The goal of this project is to expose the class to a wide variety of these software packages and to give some insight into the pros and cons of using each of them.

- **Percent of course grade:** According to the class syllabus this project will be worth 10% of your total class grade. Note the nature of this project is such that you should steadily work on it over the course of the next few weeks in order to be successful.

- **Dates:** The software report should be presented to the class on the dates of Tuesday March 15, and Thursday March 21. Every group should be prepared to present on the start of class Tuesday March 15. Groups will be chosen at random to give a short 15 minute presentation of their software to the class. A written report separate from the presentation should be prepared and submitted on Thursday March 21th. Copies of the class presentation slides should be submitted along with the report.

- **Different softwares:** There are lots of different mathematical software packages that can solve linear programs. This is where we separate 445 from 545. Each group will select a software from the following non-exhaustive list and have it approved:

```
445 software          545 software
1. Microsoft Excel    1. AMPL
2. LINDO             2. Dakota
3. LINGO            3. OpenOpt
4. Mathematica       4. PyOpt
5. Matlab           5. pulp-or
6. Sage             6. LP_Solve
7.                   7. Gurobi

More at: [http://www.orns-today.org/surveys/LP/LP-survey.html](http://www.orns-today.org/surveys/LP/LP-survey.html)
```

You may try researching software packages that solve linear programs in your groups to find an appropriate software package for yourself. All software packages should be approved by the course instructor.

- **Groups:** There are approximately 28 students in the class split. I envision the class being split into six groups with only 445 students working with 445 students and the same for 545 students working. Each group containing approximately four students. Please organize yourself into groups and pick a group correspondent by Tuesday February 23rd. Your group should pick a software above to document and demonstrate to the class. These software lists are by no means all inclusive and if you don’t see a package that will work for you and your group please by all means request that it be added to the list. All software is assigned on a first come first served basis. Your group correspondent should send me an email with group members, a fun geeky group name (Linear programming or mathematics puns are encouraged) by February 23rd. In your email you should also pick your favorite software with a fallback if you are not the first group to make that request.
The Report and Presentation: The goal here is to document your successful (or not so successful) use of the chosen software. In many cases especially at the 545 level you will need to do some work when getting the packages running, please document this (how did you go about getting the software running). Once you have your software up and running it is a good idea to benchmark it and show that it does indeed give you the correct answer. For the more advanced software packages you can do a benchmark on a small problem in lingo. For the packages like LINGO and Excel you can benchmark against a smaller problem that could be solved by hand. Please pick an interesting problem from the class, or other text, to set up and solve (one problem per group member). Use these problem to document use of the software. Discuss the limitations of the software (i.e. with the free academic licence software X will only solve problems with less than 300 variables; however, the commercial version has limits...). Please appropriately cite all of your references.

- Document the set up of the software.
- Benchmark the software using a simple problem.
- Demonstrate using the software on not only the benchmark problem but also on the more interesting problem.
- Showcase the use of the software on a problem of interest for each group member. These are interesting word problems like the ones given in the class notes and homework assignments.
- Create a 15 minute presentation showcasing your successes.
- Write a report that summarizes the groups work with the software and its use.

Once each report is done we will post the finished copies to the class website so that everyone can benefit from other groups experience with different software packages for linear programming. I will post prior to the completion of the project a grading criteria as well as a group membership self evaluation.