CPS 173 - Computational Microeconomics

Course Project
(deadlines: proposal April 9, final writeup April 30)

You are expected to do a small project for this course. The idea is to allow you to take a more creative approach to the course material. There are no specific requirements in terms of the types of techniques that you use. For example: You can define an optimization problem, perhaps related to building a new expressive marketplace of some sort, and show how to solve it using linear/integer programming, other computational techniques, or just analytically without the use of computers. You can build a new software artifact. You can try to prove a theorem. You can do an (ethical!) experiment on people. You can take a real-world scenario and try to model it using game theory. You can try to solve a small game of imperfect information by computer. Or you can do a combination of the above. If you have personal interests that you think you can integrate into this project, that is great. The project is deliberately open-ended. Of course, it should have something to do with the course material.

Whatever ideas you pursue, you should try to challenge and evaluate them. For example:

- What is the purpose of your project? What are you trying to show?

- If you modeled something, what assumptions did you make? Are these reasonable? Could you have made fewer or different assumptions?

- If you wrote some code, or a linear/integer program, does it perform well? Can it scale to large (for example, random) instances? Could you have done something that is more effective?

- Do there exist, or can you obtain, data on which you can evaluate your results? (Data can be either simulated or taken from the real world.) If your model is inconsistent with the data, why might this be?

Not all of the above questions are appropriate to every project, they are just to give some idea. You also do not need to actually execute every possible improvement that you can imagine, but it should be clear that you have thought about improvements.

The final product of your project should be a **writeup**, due on **April 30**. The writeup should explain clearly what you did (and why, i.e., what design decisions did you make along the way and why); it should also contain some evaluation of whether it worked well, and what could be done to improve it. The writeup should be *at most* 8 pages in single-column format. It can definitely be shorter; adding unnecessary text or writing in an unclear way will only reduce your score, and it is certainly possible to get a perfect score with a shorter writeup. You can put additional information in appendices, but reading the appendices should not be necessary to understand what you did. For example, if you wrote any code or an LP/IP, you should make this part of the appendix, but reading the code should not be necessary to understand what you did (instead, it may make sense to put the mathematical formulation of your LP/IP (if you use one) in the main writeup).

You may work alone or in a team (if your team has more than 3 people, talk to Vince first).

You should write a very brief (1-page) **proposal** in which you describe what you plan to do, what difficulties you will need to overcome to do it, and how you plan to evaluate what you did. This proposal is due **April 9**, though you may turn it in earlier if you want feedback faster. If you are unsure about whether something is an appropriate project, or if you are really stuck, talk to Vince.