CO602/CM740/CS795: Fundamentals of Optimization
Course Outline for Fall 2020
Instructor: S. Vavasis

1 Format

The course will be delivered via pre-recorded lectures posted on-line with live interactive office hours. If circumstances allow, there will also be in-person office hours.

2 Course requirements

- Seven problem sets. The first six are each worth 15% of the final mark, with the lowest dropped (so a total of 75%). The last is worth 25% of the final mark.
- Two one-on-one oral exams per student. Each oral exams will go over one of the problem sets. Students will have an opportunity to partially earn back lost marks by correcting problem set mistakes during the exam.

3 Topics covered

1. Linear programming and Simplex method
2. Weak and strong duality.
3. Total unimodularity
4. Network simplex and flow problems
5. Shortest path
6. Minimum spanning tree
7. Assignment problem
8. Nonlinear optimization
9. Gradient descent
10. KKT conditions

4 Prerequisites

Prior courses on linear algebra, multivariate calculus, and introductory real analysis. Knowledge of programming.

5 Homework contents

Homeworks will consist of analytic questions including proofs plus some Matlab programming. Knowledge of Matlab is not a prerequisite; the instructor will present modules on Matlab programming.