15-300 Project Milestone Report
Project: Exponential Approximations to MAX-NEQ-4SAT
Website: https://zack-lee.github.io/website/

Major Changes: Work on the project has been going at a steady pace. The last few weeks have been busy due to work in other classes, such as compilers and finals. Due to the increase in work recently I have pushed back some of my work and literature reading to winter break, where I will have more time. Overall plans for all next semester have remained constant though.

Accomplished: I have watched the relevant lectures of Ryan O'Donnell's 15-751 Theorist's Toolkit, to be able to understand CSP's and how semidefinite linear programming. I have not met with Venkat yet, but will plan to schedule one over winter break, to find more papers to read.

Milestone: As explained above, I have mostly met my milestone from the first proposal but will attempt to catch up on my readings over winter break. The transition from in-person to remote classes for me, was accompanied by moving from PA back to my home and led to a short fall in productivity in all my classes, but we are in a good state of recovery right now.

Surprises: In watching some of O'Donnell's lectures I found the field of approximation algorithms very interesting. In a sense there has been a lot of theory devoted to showing better upper-bounds for algorithms, but most of the recent results on lower-bounds have come from the Unique Games Conjecture and PCP. It is surprising to me, since I remember learning about these in 15-251, and will attempt to try to incorporate this into my research plan as well for next semester.

Revisions: The main revisions so far have been delaying the first milestone to winter break. Another planned revision is to try to incorporate more work into finding a lower-bound for these approximations as well. Lower bounds and complexity research might be notoriously harder, so this will probably be an end goal after actually demonstrating a better upper bound.

Resources Needed: My project remains in the realm of theory research. I have found enough resources through free published research papers, or O'Donnell's YouTube channel as well, that I do next expect I will need any software/hardware resources of note.