Journal Report 6
10/7/19-10/14/19
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Daily Log

Monday October 7

Verified that my proof from last week worked and that there were no holes.

Tuesday October 8

Began compiling data between scarcity and MIS ratio.

Thursday October 10

Finished the data compilation calculated the pearson coefficient.

Timeline

Date	Goal	Met
9/30	Find a way to make Mathematica work with weighted vertices in order to finalize the {-1,0,1}^{3} case with varying amounts of 1s and -1s	Yes, by specifying the exact number of vertices required by Mathematica. This shows 100/316 to be a minimum for symmetric cases.
10/7	Find an answer for asymmetric amounts of 1s and -1s.	Yes, the answer is intuitively the same as above, and I found a proof showing that.
10/14	Find the correlation coefficient between the density of the graph and the maximum independent vertex set for different sets using $\{-1, 0, 1\}$	Yes, however the data was not great.
10/21	Find an effective approximation algorithm for MIS	
10/28	Implement an effective approximation algorithm for MIS	

Reflection

The goal of this week was to see if the density of edges the graph was a very good heuristic for the maximum independent set. Intuitively, it should be, however I came into a massive roadblock along the way. The size of the graph played a huge role in contributing to the MIS (more so than the density of the graph). It was also incredibly hard to keep size constant, because then I'd be finding the correlation coefficient of 4 terms or something. When I put everything together, regardless of size. I found there was some negative correlation, meaning that when the graph was denser, there was a smaller MIS. However, the r^2 value was only 0.4351.

I think a lot of my problems come back to the issue of not being able to get quite enough data because of the limitations of my current algorithms. I will work on rectifying that over the next two weeks by finding good approximation algorithm.