During my research meeting with my mentor this week, we successfully optimized the analysis of the algorithm presented for Independent set to create a logarithmic speedup for 3-colorable graphs. We further discussed many ideas I had about modifying the algorithm itself. I’m currently attempting to pursue the idea of using Konig’s theorem to, at each recursive step of the algorithm, not only keep or remove a vertex, but also remove the smaller of the two Independent Sets in its neighborhood. It is still unclear to me if this idea will work, but I believe it is worth pursuing as it should help provide some insight into the structure of 3-colorable graphs.

For next week, I would like to try to see if any ideas that have the potential to be generalized beyond 3-colorable graphs (to k-colorable graphs) can be used instead. My research mentor has told me to read about semi-definite programming as a start to this, so I plan to spend the next few weeks playing around with the original 3-colorability idea, as well as learning SDP and drafting some potential questions for future steps and coming up with ideas using this.