Research Work Plan

Goal / Questions to Answer	Low Target	Expected Target	High Target
Finish implementing Ball reflection version of sampling algorithm. Write up details of how the algorithm works.	February 8th	February 1st	February 1st
Compare Ball to Facet reflections. How does convergence change as we increase dimension? Number of facets? Analyze difference for each of these:	--------------------- --------------------- ---------------------	--------------------- --------------------- ---------------	-------------------- -------------------- -------------------- -------------------- ------------
- Distance between average and centroid as we perform more iterations - Convergence of marginal distribution. Is it sufficient to observe the distribution each time we double the number of iterations or is something finer needed?	February 15th	February 15th	February 8th
- Convergence of average signed distance of points to an arbitrary hyperplane containing the centroid.	February 29th	February 22nd - Can we somehow relate this to the marginal distribution?	February 22nd
Find good center for each facet to anchor a large ball - add slight convex curvature to facets. Compare with both ball and facet reflections.	March 22nd	March 8th	March 8th
Create reflection function dependent only on position, not on the incoming direction. Compare as above	--------------------- ---------------------	March 22nd	March 15th
How does each sampling method fare for approximating volume? - Which stopping criteria mentioned above is most relevant? - How many iterations are required to achieve an ϵ-approximation depending on dimension?	April 12th	April 5th - Can we say anything about time complexity polynomial in dimension and error?	March 29th
Lines nearly parallel to a facet can drastically increasing running time. How often do these occur? - Analyze average angle with facet. - As we near the facet, what is probability of hitting a ball?	END OF SEM. – First weeks of Fall 2019	END OF SEM. - Prove this indeed occurs rarely.	END OF SEM.
How to deterministically choose initial direction?	Sept. 27th	September 13th	September 6th
Does initial starting position matter significantly?	Oct. 11th	September 27th	September 20th
Given a hyperplane cutting the polytope in a portion of small volume, can we get stuck there for a long time?	Nov. 1st	October 18th	October 4th
Put results together. Additionally prove everything mentioned in the expected and high targets if we were unable to. There may be some we don't know how to prove.	END OF 2019 - We would have less time to prove certain results if we haven't been able to along the way.	END OF 2019	END OF 2019