4. Student Preparation and Motivation: The most outstanding aspect of our S3 project is what was explained in Section 1: that the project does not confine itself to just one area of mathematics. In the fall semester of 2016, I read a brief description of the project, suggesting that geometries can come out of the algebraic study of groups, and I met with ███ to see how I could involve myself in such a project. In the same time span, I took a course, MTH 495, that emphasizes the interconnectedness of the various threads in modern mathematical thought. I appreciated how the project will make that vision more concrete by giving me an opportunity to get my hands dirty and unearth some of those relationships for myself. Indeed, in our project, no one step can be made without working simultaneously in the diverse areas of geometry, algebra, and topology.

I have a strong enough background in the respective areas to benefit from this project. I have taken a course on Euclidean geometry which included a segment on generalizations beyond the classical conception of space. I am familiar with the nature of the geometries that will arise when we proceed to study geometries from groups. Furthermore, I have studied group theory on my own in the past, and I am currently enrolled in a course on group theory that will solidify my understanding. Finally, I excelled in a course on topology, which works with and abstracts from the basic notion of distance. Thus, I comprehend the technical details that are involved in defining the geometric structure inherent in the collection of subgroups of a group, which we discussed in the second section.

While the project will be my first in-depth involvement in such a holistic mathematical project, I have glimpsed similar, fruitful interconnections in the past. In the spring of 2016, I received the GVSU Mathematics department's Outstanding Sophomore Award based on my approach to proving a special case of a major theorem in linear algebra, the Perron-Frobenius Theorem. In proving that theorem, I used ideas from another area of mathematics, namely real analysis. Cases like that suggest I will find myself at home as we move forward on our project.

During the fall semester of 2016, I had started thinking about our project and have come to appreciate its difficulty. I worked on the case of the integers, which was used as an example in previous sections, and a jungle of lines awaited me as I began to investigate the geometry of its subgroups. To be equipped for handling the challenges, the S3 project will begin with an intuition-building stage before I delve into some of the harder problems.

Due to the nature of the S3 project and the experience of my mentor, █████, I will have an outstanding research experience. It will benefit me when I graduate from Grand Valley State University and move on to graduate studies in mathematics. In the first place, the S3 project will provide me with a research experience. Secondly, I will have seen for myself many of the ways in which multiple disciplines in mathematics can interpenetrate one another. Having the experience of this S3 project will position me for further mathematical research as I work to become a modern mathematician.

Additionally, presentations of findings in various settings through different media is inherent in S3 projects. I look forward to becoming seasoned in communicating mathematical ideas to █████, my peers, and interested non-mathematicians. While I have taken courses that involve presentations and productions of written works, I have not received continuous feedback from a mathematician on a work in progress. The frequent meetings and further efforts to communicate through an on-site REU during our S3 project will give me just that opportunity. Presenting finalized results in both written and verbal forms will help me feel comfortable with opening my ideas up to others and receiving feedback on something that I am proud of.