

# Quarterly Report

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# 1 Reading

1. Introduction to Lie Algebras and Representation Theory by James Humphreys - Chapters 2 and 3 of 7.

# 2 Research

1. Wrote an algorithm to write a word in the generators for  $\Omega^-(d, F)$ , char  $F \neq 2$  in a non-natural representation
2. Calculated generators for  $\Omega^-(d, F)$ , char  $F = 2$
3. Wrote algorithms to write a word in the generators for  $\Omega^-(d, F)$ , char  $F = 2$  in both a natural and a non-natural representation
4. Wrote algorithms to write a word in the generators for  $\Omega(d, F)$ ,  $d$  odd, char  $F \neq 2$  in both a natural and a non-natural representation
5. Wrote code to test and debug the above algorithms
6. Modified all non-natural representation algorithms so that they were able to work over non-natural representations of the same characteristic rather than the same field
7. Modified the Unitary group algorithms so that they ran faster
8. Assisted a colleague at Imperial with his problem
9. Modified `MatrixPGroupWordInGen` so that it ran faster
10. Wrote 22 pages of a paper that will eventually be turned into a thesis
11. Started work on writing code to Construct algorithms to write an element of  $\text{PSX}(d, q)$  as an element of its generators by considering how the generators act on the projective points.
12. Timed all algorithms against various variables

# 3 Seminars

1. I gave a Pure Maths Seminar based on my research

## 3.1 Things To Be Done

1. Calculate the complexity of the algorithms for which this has not yet been done
2. Continue with the  $\text{PSX}(d, q)$  work
3. Continue writing the paper