Potential Project Topics

- **Ramsey theory**: groups of people who either all know each other or all don’t
- **Catalan numbers**: different items that are counted by Catalan numbers
- **Pascal’s triangle**: Identities, interesting facts
- **Fibonacci numbers**: appearance in nature, interesting facts
- **Permutation groups**: Brings together algebra and combinatorics
- **Permutation patterns**: different patterns appearing within permutations
- **Real-world applications**: applications to biology, computer science, cryptography
- **Rook theory**: Ways to place non-attacking pieces on chessboards, often of varying shapes and sizes
- **Generating functions**: ways to use an algebraic sequence to capture all the information of a sequence in one simple function
- **Lattice walks**: self-avoiding walks are like lattice paths except you can move in all four directions but the path can’t cross itself
- **Partially ordered sets**: sets in which not all elements are comparable, lots of possible projects here, nice diagrams
- **Geometric combinatorics**: (There are lots of interesting projects here, involving things like polytopes (Pick’s theorem),
- **Partitions**: Like compositions but order doesn’t matter; neat representations and some interesting open questions