A Function for a Friendship

For this model we were asked to develop an equation, based on very small number of social factors that would mimic complex group dynamics that change in time, how they would change over a long portion of time, and what will happen to the stability of old groups with the addition of new groups. To create the model, we examined a model for population dynamics: \( \frac{dN}{dt} = \lambda \cdot t \). This equation looks at a population of people of size \( N \), that their growth \( (dN/dt) \) is proportional to their size by \( \lambda \), where \( \lambda \) is their rate of growth.

Since cliques are a grouping of people based on a resource (people with certain traits) this was the optimal choice for basing the clique model off of. In our model the first consideration that needed to be made was size. Unlike the population dynamics model this model looks at groups within the student body, this means any one clique can be no larger than the student body itself and no smaller than no students at all.

These boundaries are accounted for by the condition: \( N = G + C \) where \( N \) is the total number of students in the school, \( G \) is the number of students outside the focus clique (or in no clique at all) and \( C \) is the number of people within the clique. Thusly the clique \( C \) can be no larger than \( N - G \) so if \( G = N \) \( C \) is zero and if \( G \) is zero then \( C = N \). (This boundary can be edited with multiple cliques by simply adding another variable to the equation e.g. \( N = G + C + A \) to add clique \( A \)). where \( C \) is defined by the function: \( \frac{dC}{dt} = \lambda \cdot C \) where \( \lambda \) the addition or removal of members as a function of time.

This \( \lambda \) function would be based on the attractiveness of a clique type to a school populace based on openness, neuroticism, agreeableness, conscientiousness, and extraversion. (otherwise known as the big five personality traits) as cliques not based on
personality type would not grow as well and cliques based on personality types that are more common would grow better and quite possibly steal popularity of the already existing cliques.

This model could be improved with the addition of decision theory to optimise the decision making process as to the $\lambda$ function, as well as sociomapping for diversity. According to the Stanford Encyclopedia of Philosophy, “Decision theory is concerned with the reasoning underlying an agent’s choices, whether this is a mundane choice between taking the bus or getting a taxi, or a more far-reaching choice about whether to pursue a demanding political career.” With more given time, Decision Theory would have played a bigger factor in how people choose the cliques they decide to be apart of. We would further be able to analyze the attractiveness of a clique. With further analyzing how attractiveness one clique is from another we would be able to see the underlying factors that cause a group to increase or decrease from another.

We can apply this to a real life situation. For instance, if a school has 200 students, and 30 of them are in Clique 1 ($C$), 20 of them are in Clique 2 ($A$), and the non-cliqued students ($G$) is 150. Based on the $\lambda$ function we can use it to model the attractiveness from one clique to the other and with the function of $t$, analyze the average time frame it takes for one group to gain or lose members of their clique from the other.