**Unit 3 Algorithmics**

**Week 4 Submit Task**

This week you can start to prepare for the School Assessed Task.

1. Read the U3 SAT 2023 Outline carefully.
2. Find 1-2 possible real life transport networks which have 15-25 nodes.
3. Include these images and annotate to show:
   1. What ‘nodes’ will represent
   2. What ‘edges’ will represent
   3. What the weights of edges will represent
   4. Whether the graphs should be directed or undirected
   5. Any aspects of the problem which cannot be represented with simple graph terminology, and how you might incorporate them into your design using other ADTs.

Think of this as more of a brainstorming/ideas session than any kind of assessment. Your work does not need to be particularly polished – what matters is the thought that you put into representing the real life problem.

# First Idea

Transport Network of my school (Caulfield Grammar School – Wheelers Hill), which has 37 “locations” just on the [map](https://caulfieldgrammarians.com.au/wp-content/uploads/2018/06/Wheelers-Hill-Campus-map.pdf), but most of these are buildings with further classrooms, so it may have to be a restricted model to a particular area/scope.

* 1. The nodes will represent locations or classrooms at my school. They may be linked to particular VCE subjects, each subject having a corresponding classroom.
  2. The edges will represent a path from one location to another.
  3. The weights of the edges will represent the time taken by walking to get from one location to the other.
  4. The graph should be undirected because at the school you can walk back from any location by the same path.
  5. The subject type, teachers that teach at the class and friends at each class could all be represented using a dictionary and lists for each location. This could add to the functionality of the model such as if you want to drop off your friends at their classes before going to your own, or if you would like to avoid a certain teacher on your travels.  
     If each class is linked to a specific VCE subject, the model may also be adapted to add a “popularity” or rating of each subject, allowing for students to pick subjects based on proximity and popularity.

# Second Idea

Transport Network of my friends’ houses and how to get to them using public transport. I have about 20 houses I could plot out on Google Maps to find the minimum distance and cost to get from one house to the other.

1. The nodes will represent each of my friends’ houses.
2. The edges will represent a route (bus or cycle) from one house to another.
3. The edges will represent the time taken to travel from one house to the other. This also would represent the cost, as by cycle the cost would be 0 and by bus, the time would be directly proportionate to the cost.
4. The graph should be directed in the case of public transport because bus lines only go from one place to the other but should be undirected in the case of cycling since you can go back.
5. The time that each friend wakes up, the amount of time they take to get ready, who is friends with whom, and traffic conditions at different times of the day can all be modelled using dictionaries and lists. This could be used to add functionality such as making sure you arrive at friends’ houses after they are awake and factoring in waiting times at each house, what time of day is most efficient to leave from a set amount of options, or different transport methods such as cycling or bus (some friends may not have a cycle, so a combination of the two forms may be used to save money).  
   Further complications may be added by thinking of a separate graph of a friendship network, requiring that a certain number of “close friends” are within the travel party at all times, which may influence the path taken.