# Section 1

## Problem specification:

The problem is that a traffic simulator is required in order to simulate traffic in accordance with Australian road rules. The program that resolves this problem will be used through an interface that allows a user to specify certain aspects of the program in order to allow it to simulate a wider variety of scenarios. The program will utilise classes in order to ‘divide and conquer’ the problem and allow for efficient running.

## Problem decomposition using UML class diagrams:

A screenshot of a cell phone

Description automatically generated

The objects that will be used currently include:

* Car object
* Traffic light object
* Road object

The car object will be responsible for controlling the length of the car and tracking the position of the car. The road object will contain segments that allow a car to ‘drive’ down the road until it encounters an intersection. The traffic light object will contain a Boolean that will prevent/allow the car object to move from one road object to another.

### Class design:

Currently, all classes/methods/variables are declared as public due to early stage of code testing.

The Main class will act as the simulator. Currently, it controls car movement and road object declaration and storage. It interacts will all implemented classes in order to allow them to communicate with each other to produce a programme.

The Car class requires length, position, and road number. The length will determine the size of the car, the road, and both the motorbike and bus. The position will track the car’s position as it moves through the road segments. The road number will track on what road the car resides. The class will interact with both TrafficLight and Road by only moving when a trafficlight object allows and by using the road to track its own position. The methods that the class requires will only be getters and setters, as well as an initial value constructor.

The Bus and Motorbike classes currently have no purpose in the simulation. Eventually, they will calculate the lengths of a bus and motorbike object respectively, using Car as a superclass.

The TrafficLight class will contain a Boolean that is capable of being changed from red to green. It will primarily interact with the car in order to determine if the car can move or not. This class will also contain getters, setters. It will also contain changeLight(), which will use a random number generator in order to decide if the light will change or stay the same.

The Road class will contain its length and number. The length of the road will be determined by the length of a car. The road number will simply act to identify the road object from another road object. It will contain segments that allow the car to track itself on the road. The road will contain getters, setters and an initial value constructor.