The car is able to drive at least 4.32 miles without incident..

The car drives according to the speed limit.

Max Acceleration and Jerk are not Exceeded.

Cars do not have collisions.

The car is able to change lanes

To solve these issues the following code really helped slow the car down whenever it was too close to another car.

There were more implementations about these in the preceding lines. Code is commented with explanations.

```
180                         // if the car is too close to another car make sure the speed is modified
181                         if (tooClose)
182                         {
183                             ref_vel -= 0.224;
184                             if (isLeft != true && isRight != true && lane == 1)
185                             {
186                                 // lane -= 1;
187                                 if (speedOfLeftCar > speedOfRightCar)
188                                 {
189                                     lane -= 1;
190                                 }
191                                 else if (speedOfLeftCar < speedOfRightCar)
192                                 {
193                                     lane += 1;
194                                 }
195                             }
196                             else if (isLeft != true && lane > 0)
197                             {
198                                 lane -= 1;
199                             }
200                             else if (isRight != true && lane < 2)
201                             {
202                                 lane += 1;
203                             }
204                         }
205                         // makes sure it it doesnt go over 49.5 mph
206                         else if (ref_vel < 49.5)
207                         {
208                             ref_vel += 0.224;
209                         }
```

The car stays in its lane, except for the time between changing lanes.

```
115                         }
116
117                         // for collision avoidance
118                         bool tooClose = false;
119
120                         // booleans to check in left and right lane are safe
121                         bool isLeft = false;
122                         bool isRight = false;
123
124                         // variables to check for cars similar to the one provided in the video
125                         double check_right_lane_car, check_left_lane_car;
126
127                         // variables to determine the speed of the cars in the left and right lanes
128                         double speedOfLeftCar, speedOfRightCar;
```

The following variables were used to make sure the left lane is clear, the right lane is clear, and the speed of the car is checked with the following line located on line 138.

double checkSpeed = sqrt(vx * vx + vy * vy);

The code is commented with explanation in more detail.