ASSIGNMENT-4
TRAFFIC SIMULATION AND MODELLING

SOLUTION (Excel file attached)
Qn-1

Mean arrival rate = 0.3 (customers/min)
Inter arrival time = -ln (1-rand())/0.3

Service Duration Time has uniform distribution between 2.5 to 4.5 mins
Service Duration = 2* rand() + 2.5
(random number is always generated between 0 and 1, so it multiplied with 2 and added with 2.5 to obtain the values between 2.5 and 4.5)

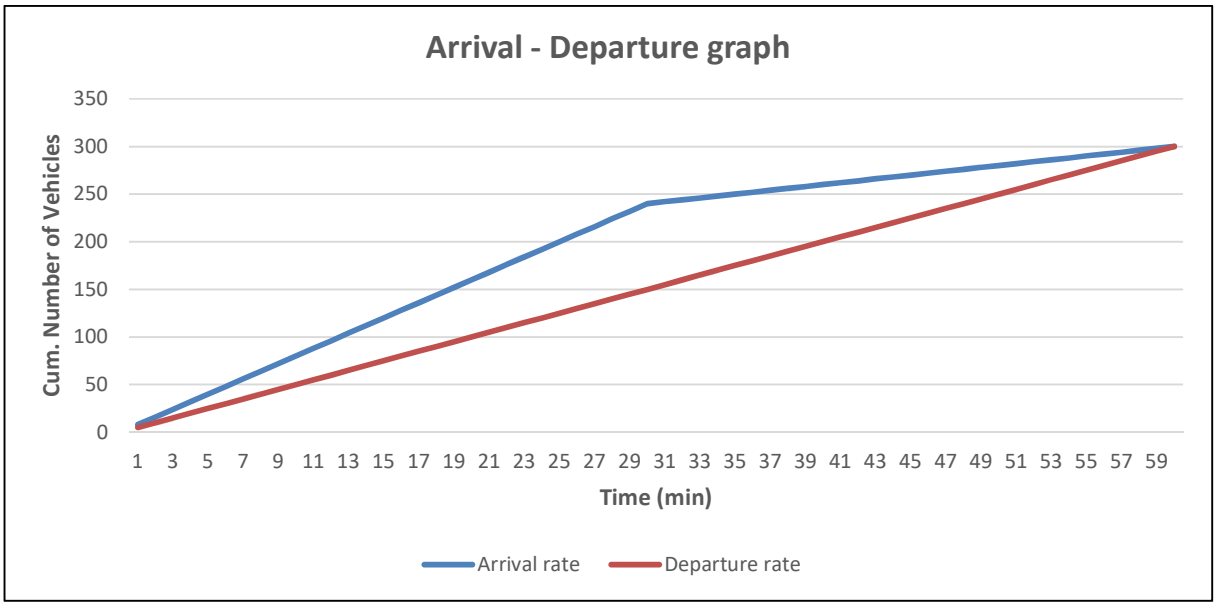
1. Number of customers served per day (2 hours) = 34
2. Total delay per day = 177.68 mins
3. Average waiting time = 5.23 mins

Qn-2

Cumulative arrival rate = { 8t (0<= t <=30)
{ 2t + C (30<= t <=60)

At t= 30 mins, 8t = 2t + C
C = 180 mins

Cumulative departure rate = 5t (t > 0)

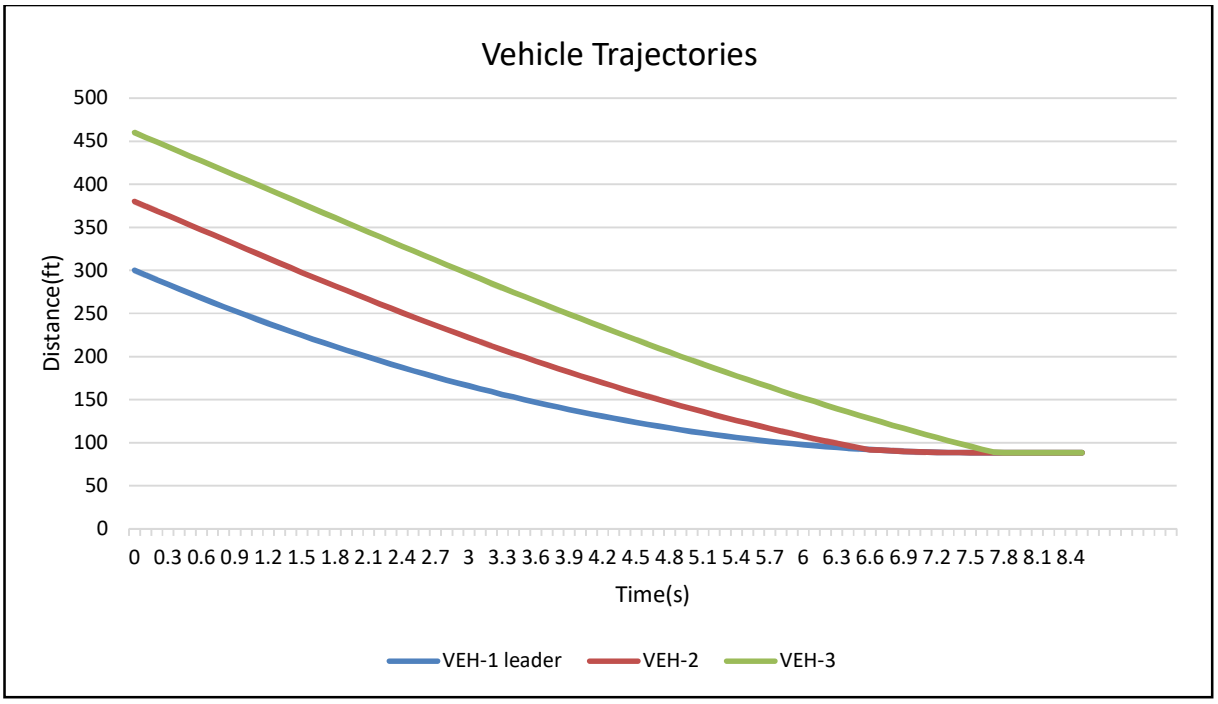


Cumulative arrival rate and departure rate meet at , 2t +180 = 5t, therefore at t= 60 mins queue will disappear.

Total queue length = 2* (0.5 * 30 * 90) = 2700
Average queue length = 2700 / 60 = 45
Total waiting time = 2700 * (12/60) = 540 mins
Average waiting time = 540 / 60 = 9 mins

Qn-3

GM Model 1: $\ddot{x}_{n+1}(t + \Delta t) = \alpha_0[\dot{x}_n(t) - \dot{x}_{n+1}(t)]$



The leader vehicle and the follower car-1 collide with each other at **6.6** seconds and they will be at **91.5 ft** from the traffic signal. Similarly, follower car-1 and car-2 will collide at **7.8** seconds and they will be at **88.25ft** from the traffic signal.