

The stochastic nature of traffic behaviour

Question 1. Assume a bus stop that multiple bus lines share. The number of buses arriving at the bus stop is on average 1 bus per minute. Dwell time of each bus is stochastic and takes an average of 20 seconds. Find:

- The probability that the bus stop is empty.
- The probability of having 1 bus at the bus stop.
- The average number of buses waiting for the bus stop.
- The average total time of buses to leave the bus stop.

Question 2. A motorway ramp holds 15 vehicles. A ramp metering system controls the entrance of vehicles into the motorway such that on average 1 vehicle enters every 6 seconds. On average 1 vehicle arrives at the ramp every 8 seconds. Determine

- The percent of the time ramp is empty.
- The percent of the time ramp is full.
- The expected queue size on the ramp.