COMP9334 Revision Problems for Week 4A

Question 1

Customers arrive at a grocery store's checkout counter according to Poisson process with rate 1 per minute. Each customer carries a number of items that is uniformly distributed between 1 and 40. The store has 2 checkout counter, each capable of processing items at a rate of 15 per minute. To reduce customer waiting time in queue, the store manager considers dedicating one of the two counters to customers with x items or less and dedicating the other counter to customers with more than x items. Write a small computer program to find the value of x that minimises the average customer waiting time.

(This question is taken from Bertsekas and Gallager, "Data Networks", Question 3.29)

Question 2

A communication line capable of transmitting at a rate of 50 kbits/s will be used to accommodate 10 sessions each generating Poisson traffic at a rate of 150 packets/minute. Packet lengths are distributed as follows: 10% of the packet are 100 bits long and the rest are 1500 bits long. Find the mean queue length and how long a packet has to wait before it starts its transmission on the communication line. You can assume that there is sufficient buffer space to store the queueing packets.