

### Assignment 2 Day 3

1. Suppose you manage a call centre that handles customer service calls for a credit card company. Because of the high call volumes, you find your workers are very highly utilized. This causes a build-up of “inventory”, i.e. angry customers who are on hold for long periods of time. There is also a lot of variability in the amount of time each customer call takes. You are considering to alternatives to improve the process:
  - (a) Add capacity by hiring more operators
  - (b) Reduce variability in caller service times

What impacts will these two improvements have on the number of callers put on hold? If the second option is implemented, will this reduce or increase the need to add capacity? Briefly justify both answers.

2. Bob the Barber owns a one-chair shop. At Barber School they told Bob that his customers would exhibit a Poisson arrival distribution, and that he would provide an exponential service distribution. His market survey data indicated that customers arrive at a rate of 2 per hour. It will take Bob an average of 20 minutes to give a haircut. Based on these figures, find the following:
  - (a) The average number of customers waiting
  - (b) The average time a customer waits
  - (c) The average time a customer is in the shop
  - (d) The average utilization of Bob’s time
2. Customers enter a camera department of a store at the average of a rate of 6 per hour. The department is staffed by one (1) employee, who takes an average of 6 minutes to serve each arrival. Assume this is a simple Poisson arrival rate, and exponential distributed service time distribution.
  - (a) As a casual observer, how many people would you expect to see in the camera department (excluding the clerk)? How long would a customer expect to spend in the camera department (total time)?
  - (b) What is the utilization of the clerk?
  - (c) Another clerk has been hired for the camera department who also takes an average of 6 minutes to serve each new arrival. How long would a customer expect to spend in the camera department now? (Assume only one line will form)