Probability

LLE – Mathematics and Statistics

1. The table shows a summary of data from the Pecs Bar and Gym, relating to session attended and whether the customer came to the session by car or not.

Customer Frequencies by Session and Journey

Session	Car	No Car	Total
Free Weights	3	?	**4**
Cardio Machines	4	?	**5**
Fitness Class	?	2	**4**
Bar	?	?	**3**
Total	**10**	**6**	**16**

   (a) Complete the two-way table

   (b) A person is selected at random. Find the probability that:

      i. they went to the fitness class

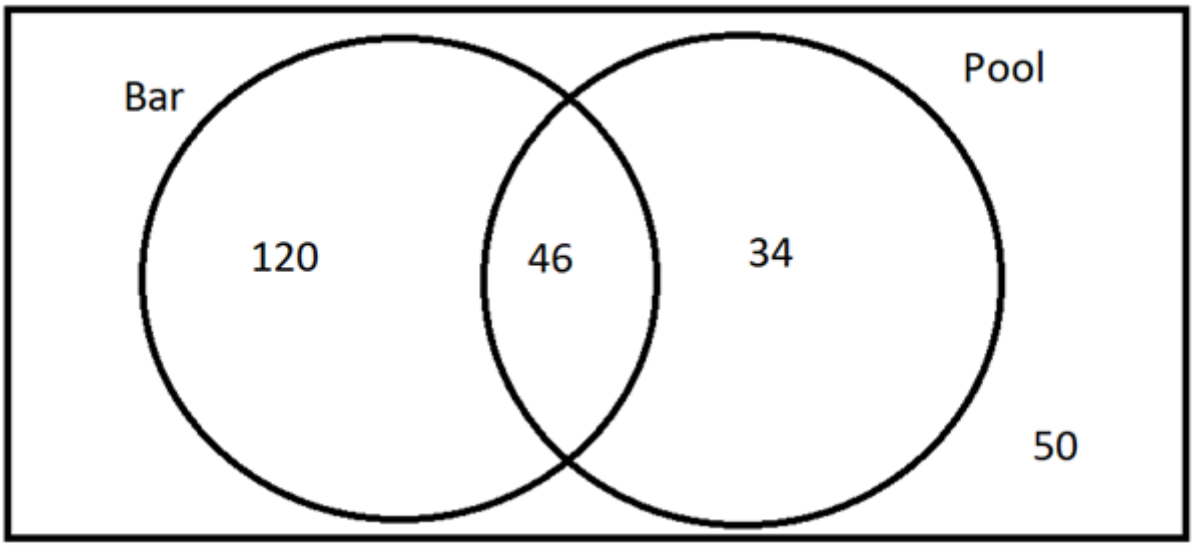
      ii. they came by car

      iii. they used the cardio machines and came by car

      iv. they did not use free weights and did not come by car

   (c) Given that a randomly selected person came by car, what is the probability they went to the fitness class?

2. The Pecs Bar and Gym carry out a larger-scale study of its facility usage. The diagram below summarises some of the findings.



(a) What is the name given to this type of diagram?

(b) How many people were included in the study?

(c) What is the probability that a randomly selected person used the pool?

(d) What is the probability that a randomly selected person used both the pool and the bar?

(e) What is the probability that a randomly selected person did not use the bar?

(f) What is the probability that a randomly selected person used the pool or the bar?

(g) Given that a person used the bar, what is the probability that they used the pool?

(h) Are the events of attending the pool and using the pool independent?

(i) Two people are randomly selected from the group. What is the probability that

i. they are two people who both used the pool?

ii. at least one of the two people used the pool?

3. Customers can use lockers while enjoying the facilities of the Pecs Bar and Gym. The management of the locker keys is quite messy;

all the keys are just randomly left in a drawer.

There are 90 green tagged keys, numbered 1 to 90. There are 60 red tagged keys, numbered 1 to 60.

The first customer of the day appear and then they ask for a locker. The receptionist reaches into the drawer and pulls out a key.

(a) What is the probability that they get a green tagged key?

(b) What is the probability thet they get a key numbered over 50?

It's a slow day. The customer does their thing and returns the key to reception. No other customers have entered during this time. Just as the reception thinks about closing early for lunch, a group of three people make their way into the building. They all want lockers.

(c) What is the probability that all three get green tags?

(d) What is the probability that all three get tags of the same colour?

4. The company gets its equipment from two supplies, supplier X and supplier Y, with 70% of the equipment coming from supplier X. Evidence suggests that supplier's X equipment has a 5% chance of failing in the first year. The figure for supplier Y is 8%.

   (a) By making use of a tree diagram, or otherwise, find the probability that a randomly selected piece of equipment:

      i. is from supplier X and fails in the first year

      ii. fails in the first year

   (b) Given that a piece of equipment fails during the first year, find the probability:

      i. it was from supplier X

      ii. it was from supplier Y

5. The bar staff at the Pecs Bar and Gym have a game they play with customers. The bar staff member picks a card at random and will offer a free drink if the customer can guess what it is.

   (a) What is the probability that the customer guesses the correct card?

   The customer is unlikely to win. To help the customer, they are allowed to ask a single 'yes/no' question, from the list below, which the bar member will answer honestly, before they guess. The choices of questions are:

   - Is the card a red card?
   - Is the card a club?
   - Is the card the 5 of diamond

   (b) Work out the new probabilities of guessing correctly for each of these initial questions.