Descriptive Statistics

LLE – Mathematics and Statistics

1. Below is a questionnaire that is given to customers who visit the "Pecs Bar & Gym", the place for those who want mean pecs, or a drink. Determine the level of data (Nominal, Ordinal, Interval, Ratio) produced for each of the questions.

   a) Do you use a car to come to the gym?
      - Yes
      - No

   b) How would you rate the cleanliness of our facilities?
      - Excellent
      - Good
      - Average
      - Poor

   c) What distance, in km, do you live from the gym? (Please provide a number)

   d) How many times did you visit the gym last month?

   e) Which of these services did you use on your last visit? (Tick all that apply)
      - Free Weights
      - Cardio Machines
      - Fitness Class
      - Bar

2. A sample of 16 customers are asked about the session they attended on their last visit and whether they came by car. The results are shown below:

Session	Journey
Free Weights	Car
Cardio Machines	Car
Fitness Class	No Car
Bar	No Car
Cardio Machines	Car
Free Weights	No Car
Fitness Class	Car
Cardio Machines	No Car
Bar	No Car
Free Weights	Car
Cardio Machines	Car
Fitness Class	Car
Free Weights	Car
Bar	Car
Cardio Machines	Car
Fitness Class	No Car

a) Create a cross-table (contingency table) for the frequencies of customers, with session in the rows and journey in the columns.

b) What percentage of the 16 customers used a car?

c) Of those who used a car, what percentage used the cardio machines?

d) Create a stacked bar chart, with session on the horizontal axis and a vertical axis that represents the percentage of customers for that session. Each bar should be stacked to show the proportion who used a car and who didn't.

3. The gym is interested in how long it takes people to get to the gym. They conduct a survey of 8 people and ask how long it has taken them to get to the gym in minutes. All 8 people used a car to get to the gym. The sample results were:

12, 15, 16, 18, 20, 21, 22, 28

a) Calculate the mean time.

b) Calculate the median time.

c) Calculate the range of times.

d) The gym is also interested in the standard deviation. Use the formula below to calculate the sample standard deviation, s. (You may find organising the data into a table useful for the next parts).

$$s = \sqrt{\frac{\sum(x - \bar{x})^2}{n - 1}}$$

   i) Write down the 8 times with the mean subtracted from each of them $(x - \bar{x})$.

   ii) Square each of the 8 values from part i $((x-\bar{x})^2)$. Remember squares are always positive.

   iii) Add all the values from part ii together. This is the sum of squares, $\sum(x - \bar{x})^2$.

   iv) Divide your answer to part iii by $n - 1$, where n is the sample size.

   v) What statistical name is given to the value calculated in part iv?

   vi) Find the sample standard deviation (s) by taking the square root of your answer to part iv.

e) In a sample of people who did not use a car, the following statistics were found:

   - Mean = 25 minutes
   - Median = 24 minutes
   - Range = 18 minutes
   - Standard Deviation = 6.2 minutes

   Compare the time taken by car users with the time taken by non-car users to get to the gym.

4. The following dataset of 10 numbers has a mean of 5.5 and a sample standard deviation of 1.96.

   5, 4, 7, 7, 8, 9, 4, 5, 4, 3

   Showing how you can use the information above, find the mean and the standard deviation of the following datasets.

   a) 5000, 4000, 7000, 7000, 8000, 9000, 4000, 5000, 4000, 3000

   b) 105, 104, 107, 107, 108, 109, 104, 105, 104, 103

   c) 5100, 4100, 7100, 7100, 8100, 9100, 4100, 5100, 4100, 3100

   Use the same technique, showing your working, to find the mean and standard deviation of the following dataset of 8 numbers:

   d) 20000, 20000, 30000, 40000, 60000, 70000, 70000, 90000