

# **MA220 – Univariate Statistical Analysis**

## **Assignment**

### **Raw Data Analysis**

#### **INSTRUCTIONS:**

- **Answer ALL questions** in a Word format file.
- **Clearly label both questions and their sub-questions; failure to do so will result in NO marks being awarded.**
- State your assumption(s) and ensure that all calculation questions **must clearly demonstrate appropriate working.**
- Save as this format “**Your name\_Student number\_assignment**”:
  - For example: my name is Peter Ho and my student number is 1234567.
  - I should save my working as “**Peter\_1234567\_assignment**”.
- Submit your Word file on via CANVAS no later than the due date.
- Suggestion: Save your work regularly (every 10 minutes perhaps).

## Case Study (49 marks): FitLife Gym – Personal Training Progress

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FitLife Gym is a fitness centre based in Western Australia. At the beginning of each year, it offers a 12-week personal training program. A total of 30 clients enrolled in the most recent program. After the program ended, the clients were assessed on their weight loss and were assigned a fitness achievement level.

The weight loss and fitness achievement levels were classified as follows:

| Weight Loss (kg) | Fitness Achievement Level |
|------------------|---------------------------|
| 0.0 – 2.9        | Needs improvement         |
| 3.0 – 4.9        | Satisfactory              |
| 5.0 – 5.9        | Good                      |
| 6.0 – 6.9        | Very good                 |
| 7.0 and above    | Excellent                 |

The 30 clients' weight loss results (in kg) are listed below:

3.2, 4.5, 5.1, 4.4, 5.5, 2.0, 1.8, 4.8, 5.5, 5.6  
6.9, 50.0, 6.6, 4.3, 1.5, 5.9, 5.4, 6.0, 8.5, 3.7  
3.7, 4.1, 6.2, 7.8, 7.1, 3.3, 6.4, 4.5, 4.2, 5.6

### Requirements:

- Two variables are summarised in this case: **weight loss** and **fitness achievement level**.
  - Is weight loss a numerical or categorical variable? (2 marks)
  - Is the fitness achievement level a numerical or categorical variable? (2 marks)Justify your answers.
- Use the **weight loss data** to describe the centre of the data. You should:
  - Calculate the mean and the median. (13 marks)
  - Comment on the shape of the distribution (e.g., symmetrical, skewed). (3 marks)
  - Discuss which measure (mean or median) is more appropriate and why. (3 marks)
- Understanding variability:
  - In your own words, explain what the **standard deviation** tells us. (2 marks)
  - Explain how the standard deviation formula works and why each part of the formula is important in measuring the spread of data (7 marks)

4. Using all the provided data:

- a. Calculate the frequency for each fitness achievement level. (2 marks)
- b. Calculate the frequency in percentage (%) for each level. (2 marks)
- c. Use Microsoft Excel to construct a bar chart showing the relationship between frequency and fitness level.

Noted:

1. The x-axis of the bar chart must show the Fitness achievement level in this order from left to right: Needs improvement, Satisfactory, Good, Very good, and Excellent.
  2. Copy and paste your bar chart into your Word file. (4 marks)
- d. Based on the weight loss data collected from the 30 clients, critically evaluate the effectiveness and fairness of the FitLife Gym's personal training program. (9 marks)

**~ END OF ASSIGNMENT ~**