

Assignment 2

Instructions

- Deadline: **September 18 (4:00 pm)**
- Format: Hard copy (on paper) only. **Submissions by MIO will not be accepted.**
- Please show all of your work on your submission.
- Notation counts. Poor notation will result in a loss of marks.
- Please leave your answers as exact values. If using decimals, please report your answer to four decimal places.
- You are encouraged to ask your instructor for help, and/or discuss ideas with your classmates. However, you must produce fully explained individual solutions.
- Under no circumstances may you simply copy solutions obtained online or from a classmate.
- In unclear cases, you may be asked to explain your solutions in a Teams meeting, and your work may be refused altogether.

1. Swiss Coffee

In April, Switzerland decided to stop stockpiling coffee because it is "not essential to survival". Due to public outcry, they have been forced to reconsider.

- (a) A survey asked several Swiss citizens how much caffeine in milligrams they consumed on an average day. The responses are summarized below:

Caffeine Consumed (mg/day)	Number of People
0	8
60	95
95	86
140	10
200	5
300	11

Calculate the average daily caffeine consumption (mg) per person.

- (b) Using the LTCF's (less-than cumulative frequencies), estimate the median daily caffeine intake.
- (c) Rank the mean, median, and mode in ascending order.

- (d) Calculate the sample variance and sample standard deviation for the daily caffeine consumption (mg).
- (e) Determine and interpret the range of caffeine consumption that includes at least 68% of the individuals surveyed.

2. Stop Signs

During the 1980s, New York City used these signs instead of standard "no parking" signs.



To get a sense of how much time drivers spent circling for a spot, several New Yorkers were surveyed about the number of minutes it took them to find parking. Their responses are summarized below:

Time Spent Looking for Parking (minutes)	Number of People
0 - 4	6
5 - 9	12
10 - 14	20
15 - 19	28
20 - 24	18
25 - 29	8
30 - 34	3

- a. Calculate the average time (in minutes) it took people to find parking.
- b. Calculate the sample variance and sample standard deviation for the parking time. Include units in your answers.
- c. Augment your table with a less-than cumulative frequencies column. Use this to estimate the first, second, and third quartiles (i.e. Q_1 , Q_2 , and Q_3)
- d. Rank the range, standard deviation, and interquartile range in ascending order.

3. Cat Graphs

In the Ukraine, the Ministry of Energy informs people about peak electricity hours and when they need to reduce power consumption to avoid blackouts, with graphs shaped like cats.



- (a) On a recent weekday, households were surveyed about their electricity used during the evening peak (17:00-20:00). The data below summarize kWh used per household that evening:

Evening Peak Use (kWh)	Number of Households
[0, 10)	2
[10, 20)	6
[20, 30)	16
[30, 40)	14
[40, 50)	8
[50, 60)	4

Calculate the average electricity consumed during peak hours for these households.

- (b) Calculate the standard deviation for the amount of electricity consumed during peak hours.
- (c) Calculate and interpret the interval that captures at least 95% of household electricity consumption during peak hours.
- (d) Each household were also asked how many high-load appliances (≥ 1 kW) they ran at the same time during the evening peak. Their responses:

Appliances Used Simultaneously	Number of Households
0	42
1	58
2	37
3	21
4	7

Calculate and rank each of the following: the range, standard deviation, and interquartile range in ascending order.

4. Supermarket Survival

The food in an average supermarket could keep a person alive for 55 years (or 63 years if you're happy to eat pet food). To explore this idea, a survey was conducted on weekly expenditures. The results for a sample of households are shown below:

Weekly Spending on Groceries (Humans):

55	56	57	59	61	61	62	67	70	70
81	85	85	87	89	89	90	90	91	91
93	94	94	94	95	95	95	96	96	96
113	116	117	118	118	118	121	122	124	128

Weekly Spending on Pet Food:

12	13	15	18	19	20	21	21	21	22
25	25	25	25	25	26	27	27	27	28
28	28	28	29	29	29	29	30	30	30
33	33	34	34	34	36	40	45	48	50

- Compute and interpret the IQR and CQV for the grocery spending data.
- Identify any outlier(s) in the grocery spending data if they exist and state the measure of central tendency (mean, median, mode) and measure of spread (range, standard deviation, IQR) that would best summarise the weekly spending on groceries data.
- Compute and interpret the IQR and CQV for the pet food spending data.
- Identify any outlier(s) in the pet food spending data if they exist state the measure of central tendency (mean, median, mode) and measure of spread (range, standard deviation, IQR) that would best summarise the weekly spending on pet food.