Introduction to Probability and Statistics

Topic (1): “Describing Data with Graphs”

Dr. Heba Ayyoub

Philadelphia University

Solution to the Exercises for the First Topic

Exercises (1): Experimental Units Identify the experimental units on which the following variables are measured:

a. Gender of a student. — **Experimental Units: The student.**

b. Number of errors on a midterm exam. — **Experimental Units: The Exam.**

c. Age of a cancer patient. — **Experimental Units: The Patient.**

d. Number of flowers on an azalea plant. — **Experimental Units: The plant.**

e. Color of a car entering a parking lot. — **Experimental Units: The car.**

Exercises (2): Qualitative or Quantitative? Identify each variable as quantitative or qualitative:

a. Amount of time it takes to assemble a simple puzzle. — **Quantitative**

b. Number of students in a first-grade classroom. — **Quantitative**

c. Rating of a newly elected politician (excellent, good, fair, poor). — **Qualitative**

d. State in which a person lives. — **Qualitative**

Exercises (3): Discrete or Continuous? Identify the following quantitative variables as discrete or continuous:

a. Population in a particular area in Jordan. — **Discrete**

b. Weight of newspapers recovered for recycling on a single day. — **Continuous**

c. Time to complete a mathematics exam. — **Continuous**

Exercises (4): Fill-in the blanks for the given frequency distribution.

Category	*f*	*r.f*	Cumulative *f*
A	**32**	**0.32**	32
B	**27**	0.27	**59**
C	**20**	**0.20**	**79**
D	21	**0.21**	100

Exercises (5): Given the following data: 21.8, 20.3, 20.9, 21.9, 20.8, 19.9, 18.8, 18.9, 19.8, 19.9, 18.9, 18, 18.7, 18.1, 18.2, 19.4, 19.5, 19.5, 18.6. Draw stem and leaf plot?

Step 1: Organize the Data in Ascending Order

Sorted data: 18.0, 18.1, 18.2, 18.6, 18.7, 18.8, 18.9, 18.9, 19.4, 19.5, 19.5, 19.8, 19.9, 19.9, 20.3, 20.8, 20.9, 21.8, 21.9

Step 2: Identify Stems and Leaves

- Stem: The leading digits (18, 19, 20, 21).
- Leaf: The last digit of each number.

Step 3: Construct the Stem-and-Leaf Plot

Stem	Leaf
18 |	0 1 2 6 7 8 9 9
19 |	4 5 5 8 9 9
20 |	3 8 9
21 |	8 9

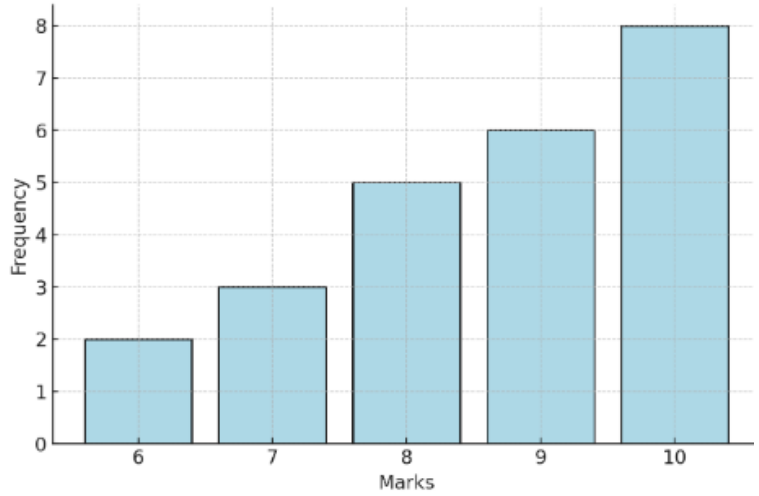
Exercises (6): Given the following data marks of students in an online quiz:

8, 8, 9, 9, 10, 10, 7, 7, 7, 8, 8, 9, 10, 10, 10, 10, 10, 8, 6, 6, 9, 9, 9, 10.

1) Construct a Frequency table.

Marks (x_i)	Frequency (f_i)
6	2
7	3
8	5
9	6
10	8

2) Draw a bar chart.



3) Describe the shape of the data? Skewed to the left.

Exercises (7): Given the following data: 1, 2, 1, 0, 2, 2, 1, 1, 0, 0, 2, 2, 1, 1, 0, 0, 1, 2, 1, 1. Where the leaf unit = 0.1.

a) Construct a stem and leaf plot.

Step 1: Organize the Data in Ascending Order

Sorted data: 0.0, 0.0, 0.0, 0.0, 0.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 2.0, 2.0, 2.0, 2.0, 2.0, 2.0

Step 2: Identify Stems and Leaves

- Stem: The leading digits (0, 1, 2).
- Leaf: The last digit of each number.

Step 3: Construct the Stem-and-Leaf Plot

Stem	Leaf
0 |	0 0 0 0 0
1 |	0 0 0 0 0 0 0 0 0
2 |	0 0 0 0 0 0

b) Proportion of measurement less than 1?

$$\frac{5}{20}$$

c) Proportion of measurement less than 2?

$$\frac{14}{20}$$

d) Describe the shape of the data? **approximately symmetric**.

Exercises (8): True or False:

1) A histogram is a graphical representation of the frequency distribution of a dataset. **True**
2) In a bar chart, the height of each bar represents the frequency or relative frequency of a category. **True**
3) A line chart is best suited for displaying categorical data. **False**
4) The shape of a distribution can be described as symmetric, skewed left, or skewed right. **True**
5) The area of each section in a pie chart corresponds to its proportion in the dataset. **True**