

BIOE 440 - Homework #1

1.

Exercise 7 of Chapter 1, page 17.

2.

Exercise 2.3.2 page 31-32. You can obtain the data in an electronic excel spreadsheet from the course webpage.

2a. Plot both a histogram and a cumulative frequency polygon for the data.

2b. Answer questions (b), (c) and (f)

introduced to the scientific method and the role of statistics and the statistician in this process.

Finally, we discussed the importance of computers in the performance of the activities involved in statistics.

REVIEW QUESTIONS AND EXERCISES

1. Explain what is meant by descriptive statistics.
2. Explain what is meant by inferential statistics.
3. Define:

(a) Statistics	(b) Biostatistics
(c) Variable	(d) Quantitative variable
(e) Qualitative variable	(f) Random variable
(g) Population	(h) Finite population
(i) Infinite population	(j) Sample
(k) Discrete variable	(l) Continuous variable
(m) Simple random sample	(n) Sampling with replacement
(o) Sampling without replacement	
4. Define the word *measurement*.
5. List, describe, and compare the four measurement scales.
6. For each of the following variables, indicate whether it is quantitative or qualitative and specify the measurement scale that is employed when taking measurements on each:
 - (a) Class standing of the members of this class relative to each other
 - (b) Admitting diagnosis of patients admitted to a mental health clinic
 - (c) Weights of babies born in a hospital during a year
 - (d) Gender of babies born in a hospital during a year
 - (e) Range of motion of elbow joint of students enrolled in a university health sciences curriculum
 - (f) Under-arm temperature of day-old infants born in a hospital
7. For each of the following situations, answer questions a through e:
 - (a) What is the sample in the study?
 - (b) What is the population?
 - (c) What is the variable of interest?
 - (d) How many measurements were used in calculating the reported results?
 - (e) What measurement scale was used?

Situation A. A study of 300 households in a small southern town revealed that 20 percent had at least one school-age child present.

Situation B. A study of 250 patients admitted to a hospital during the past year revealed that, on the average, the patients lived 15 miles from the hospital.
8. Consider the two situations given in Exercise 7. For Situation A describe how you would use a stratified random sample to collect the data. For Situation B describe how you would use systematic sampling of patient records to collect the data.

3 = an abundance of soft plaque deposits). The following table shows the plaque index scores for all 90 subjects.

1.17	2.50	2.00	2.33	1.67	1.33
1.17	2.17	2.17	1.33	2.17	2.00
2.17	1.17	2.50	2.00	1.50	1.50
1.00	2.17	2.17	1.67	2.00	2.00
1.33	2.17	2.83	1.50	2.50	2.33
0.33	2.17	1.83	2.00	2.17	2.00
1.00	2.17	2.17	1.33	2.17	2.50
0.83	1.17	2.17	2.50	2.00	2.50
0.50	1.50	2.00	2.00	2.00	2.00
1.17	1.33	1.67	2.17	1.50	2.00
1.67	0.33	1.50	2.17	2.33	2.33
1.17	0.00	1.50	2.33	1.83	2.67
0.83	1.17	1.50	2.17	2.67	1.50
2.00	2.17	1.33	2.00	2.33	2.00
2.17	2.17	2.00	2.17	2.00	2.17

Source: Farhad Atassi, DDS, MSc, FICOI.
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- (a) Use these data to prepare:
- A frequency distribution
 - A relative frequency distribution
 - A cumulative frequency distribution
 - A cumulative relative frequency distribution
 - A histogram
 - A frequency polygon
- (b) What percentage of the measurements are less than 2.00?
- (c) What proportion of the subjects have measurements greater than or equal to 1.50?
- (d) What percentage of the measurements are between 1.50 and 1.99 inclusive?
- (e) How many of the measurements are greater than 2.49?
- (f) What proportion of the measurements are either less than 1.0 or greater than 2.49?
- (g) Someone picks a measurement at random from this data set and asks you to guess the value. What would be your answer? Why?
- (h) Frequency distributions and their histograms may be described in a number of ways depending on their shape. For example, they may be symmetric (the left half is at least approximately a mirror image of the right half), skewed to the left (the frequencies tend to increase as the measurements increase in size), skewed to the right (the frequencies tend to decrease as the measurements increase in size), or U-shaped (the frequencies are high at each end of the distribution and small in the center). How would you describe the present distribution?

2.3.2 Janardhan et al. (A-2) conducted a study in which they measured incidental intracranial aneurysms (IIAs) in 125 patients. The researchers examined postprocedural complications and concluded that IIAs can be safely treated without causing mortality and with a lower complications rate than previously reported. The following are the sizes (in millimeters) of the 159 IIAs in the sample.

8.1	10.0	5.0	7.0	10.0	3.0
20.0	4.0	4.0	6.0	6.0	7.0

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10.0	4.0	3.0	5.0	6.0	6.0
6.0	6.0	6.0	5.0	4.0	5.0
6.0	25.0	10.0	14.0	6.0	6.0
4.0	15.0	5.0	5.0	8.0	19.0
21.0	8.3	7.0	8.0	5.0	8.0
5.0	7.5	7.0	10.0	15.0	8.0
10.0	3.0	15.0	6.0	10.0	8.0
7.0	5.0	10.0	3.0	7.0	3.3
15.0	5.0	5.0	3.0	7.0	8.0
3.0	6.0	6.0	10.0	15.0	6.0
3.0	3.0	7.0	5.0	4.0	9.2
16.0	7.0	8.0	5.0	10.0	10.0
9.0	5.0	5.0	4.0	8.0	4.0
3.0	4.0	5.0	8.0	30.0	14.0
15.0	2.0	8.0	7.0	12.0	4.0
3.8	10.0	25.0	8.0	9.0	14.0
30.0	2.0	10.0	5.0	5.0	10.0
22.0	5.0	5.0	3.0	4.0	8.0
7.5	5.0	8.0	3.0	5.0	7.0
8.0	5.0	9.0	11.0	2.0	10.0
6.0	5.0	5.0	12.0	9.0	8.0
15.0	18.0	10.0	9.0	5.0	6.0
6.0	8.0	12.0	10.0	5.0	
5.0	16.0	8.0	5.0	8.0	
4.0	16.0	3.0	7.0	13.0	

Source: Vallabh Janardhan, M.D. Used with permission.

- (a) Use these data to prepare:
- A frequency distribution
 - A relative frequency distribution
 - A cumulative frequency distribution
 - A cumulative relative frequency distribution
 - A histogram
 - A frequency polygon
- (b) What percentage of the measurements are between 10 and 14.9 inclusive?
- (c) How many observations are less than 20?
- (d) What proportion of the measurements are greater than or equal to 25?
- (e) What percentage of the measurements are either less than 10.0 or greater than 19.95?
- (f) Refer to Exercise 2.3.1, part h. Describe the distribution of the size of the aneurysms in this sample.

2.3.3 Hoekema et al. (A-3) studied the craniofacial morphology of patients diagnosed with obstructive sleep apnea syndrome (OSAS) in healthy male subjects. One of the demographic variables the researchers collected for all subjects was the Body Mass Index (calculated by dividing weight in kg by the square of the patient's height in cm). The following are the BMI values of 29 OSAS subjects.

33.57	27.78	40.81
38.34	29.01	47.78
26.86	54.33	28.99

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