Test1 Review, MAT1372

- Show all work and justify your answers.
- Wishing you success.
- Useful formulas:

$$\bar{x} = \frac{x_1 + x_2 + \cdots + x_n}{n} \qquad s^2 = \frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1} \qquad s = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}}$$

$$\mu = \frac{x_1 + x_2 + \cdots + x_n}{n} \qquad s^2 = \frac{\sum_{i=1}^{n}(x_i - \mu)^2}{n} \qquad s = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \mu)^2}{n}}$$

1. In a class of 20 students, 19 of them took an exam in class and 1 student took a make-up exam the following day. The professor graded the first batch of 19 exams and found an average score of 80 points with a standard deviation of 9 points. The student who took the make-up the following day scored 70 points on the exam.

(a) Without calculating the new mean, does the new student's score increase or decrease the average score? Why?

(b) What is the new average?

(c) What is the new standard deviation?

2. About 85% of human are right-handed, and the rest are left-handed. From the right-handed population, half are males and the half are females. From the left-handed population, 65% are males and the rest are females. If you have a female friend, what is the probability that this individual is right-handed ? (Hint: Try to use tree diagram)

3. Given the data in the following table, which describes the age distribution of residents in a northern New York county. Find the conditional probability that a randomly chosen resident is

(a) Between 10 and 20 years old, given that the resident is less than 30 years old.

(b) Between 30 and 40 years old, given that the resident is older than 30.

Age	Number
0–9	4200
10–19	5100
20–29	6200
30–39	4400
40–49	3600
50–59	2500
60–69	1800
Over 70	1100

4. A committee of 4 people is to be selected from a group of 5 men and 7 women. If the selection is made randomly, what is the probability the committee will consist of 2 men and 2 women?

5. Imagine you have a bag containing 5 red, 3 blue, and 2 orange chips.

(a) If drawing without replacement, what is the probability of drawing two blue chips in a row?

(b) If drawing with replacement, what is the probability of drawing two blue chips in a row?

Please turn over and finish the rest of the question.

6. Researchers collected data to examine the relationship between air pollutants and preterm births in Southern California. During the study air pollution levels were measured by air quality monitoring stations. Specifically, levels of carbon monoxide were recorded in parts per million, nitrogen dioxide and ozone in parts per hundred million, and coarse particulate matter (PM10) in $\mu g/m^3$. Length of gestation data were collected on 143,196 births between the years 1989 and 1993, and air pollution exposure during gestation was calculated for each birth. The analysis suggested that increased ambient PM10 and, to a lesser degree, CO concentrations may be associated with the occurrence of preterm births.

(a) Identify the main research question of the study.

(b) Who are the subjects in this study, and how many are included?

(c) What are the variables in the study? Identify each variable as numerical or categorical. If numerical, state whether the variable is discrete or continuous. If categorical, state whether the variable is ordinal.

(d) Identify the population of interest and the sample in this study.

(e) Comment on whether or not the results of the study can be generalized to the population, and if the findings of the study can be used to establish causal relationships.

End of this test.