

ICMA151 Statistics for Science I
Midterm Exam MAKEUP
Saturday, 17th October 2020, 12:00 – 13:50

Problem 1. The following data represent the salary (baht) for a sample of 10 employees in a company:

18,000 24,000 9,000 35,000 27,000 15,000 28,000 40,000 33,000 20,000

- a) (3 points) Find the average of salaries.
- b) (3 points) Find the median of the salaries.
- c) (3 points) Find the IQR of the salaries.
- d) (3 points) Is the distribution of this dataset skewed? If so, is it right skewed or left skewed? Explain.
- e) (4 points) If we draw a box plot for this dataset, what are the upper whisker and the lower whisker of the box plot?

Problem 2. A random sample of 500 students are classified below by gender and their level of education.

Education	Male	Female
High School	46	54
Undergraduate	176	144
Graduate	38	42

- a) (3 points) Find the probability that a randomly selected student is a male
- b) (3 points) Find the probability that a randomly selected student is an undergraduate student.
- c) (4 points) Find the probability that a randomly selected student is a male graduate student.
- d) (4 points) If the selected student is a female, find the probability that the student is a high school student.
- e) (4 points) Find the probability that a randomly selected student is either a female or an undergraduate student.

Problem 3. Let the random variable x be the weight of newborn baby (in kilogram). The probability distribution of x is shown below:

x	$P(X=x)$
2	0.1
2.5	0.2
3	0.5
3.5	0.2
4	0.1

- a) (4 points) Find the expected weight (in kg.) of a newborn baby
- b) (4 points) Find the standard deviation of weights of newborn babies.
- c) (4 points) Find the probability that a newborn baby has weight less than 3.5 kilogram.
- d) (4 points) If we believe that the weight of a baby increases one kilogram per month, what is the average and variance of weights of babies with two months old.

Problem 4. Identify each of the following variables as either quantitative or qualitative.

a) **(1 point)** Rating of the effectiveness of a new cold remedy (Not effective, effective).

b) **(1 point)** Amount of time spent assembling a five-shelf bookcase.

c) **(1 point)** Number of children in a beginning swimming class.

d) **(1 point)** University where a student is enrolled.

e) **(1 point)** Color preference for a nursery.

f) **(1 point)** Rating the U.S. foreign policy in the Middle East (fair, biased).

Problem 5. Security Systems A home security system is designed to have a 99% reliability rate. Suppose that nine homes equipped with this system experience an attempted burglary. Find the probabilities of these events:

a) **(5 points)** At least one of the alarms is triggered.

b) **(5 points)** More than seven of the alarms are triggered.

c) **(5 points)** Eight or fewer alarms are triggered.

Problem 6. A radioactive mass emits particles according to a Poisson process. The probability that no particles will be emitted in a two-second period is 0.5.

a) **(5 points)** What is the probability that no particles are emitted in a four-second period?

b) **(5 points)** What is the probability that no particles are emitted in a one-second period?

c) **(5 points)** What is the mean number of particles emitted per second?

Problem 7. The fill volume of cans filled by a certain machine is normally distributed with mean 12.05 oz and standard deviation 0.03 oz.

a) **(7 points)** What proportion of cans contain less than 12 oz?

b) **(7 points)** The process mean can be adjusted through calibration. To what value should the mean be set so that 99% of the cans will contain 12 oz or more?