Mahidol University International College

Midterm Examination
Trimester 2/ 2018-2019

Course/Code: Essential Statistics/ ICGN 103

Instructor : Aj. Thotsaporn THANATIPANONDA Section 1
Aj. Thotsaporn THANATIPANONDA Section 2

Date: Saturday, 16 February 2019
Time: 12:00 - 13:50am
Total pages: Exam 10 pages, scratch paper (last 2 pages)

Directions

1. There are 16 questions. Total score is 34 points (scale to 35 % of total grade).
2. Students are allowed to bring ONLY one-side A4 paper of the examiners handwritten information and calculator(s) into the examination room.
3. Show a reasonable amount of work.
4. You may tear apart the scratch paper. We will NOT grade any information in the scratch paper.
5. Students found cheating during the examination will be penalized according to the university's examination policy.

1. **True/False Questions**: (1 point each)

   a) _____ An *experimental unit* is the individual or object on which a variable is measured.

   b) _____ The number of earthquakes per year in Tokyo, Japan is a continuous random variable.

2. A research study comparing the risk of developing lung cancer, between smokers and non-smokers.

   a) Is this an experimental or observational study? (1 point)

   b) List the response variable. (0.5 point)

   c) List the factor (independent variable, explanatory variable). (0.5 point)

3. (1 point) Which of the following graphical tool should be used to study the relationship between the temperature at noon and the number of ice cream sales?

   A) Stem-and-Leaf display

   B) Scatter plot

   C) Histogram

   D) Dot plot

4. (1 point) Which of the following graphical tools is not used to study the shapes of distributions?

   A) Stem-and-Leaf display

   B) Cross-tabulation Tables

   C) Histogram

   D) Dot plot

5. (3 points) The following is a frequency distribution of grades of 200 students in an introductory statistics course.

Grade	Frequency
A	44
B	74
C	36
D	34
F	12

   Construct a percent frequency bar chart for this data.

6. (3 points) Sam got her friends to do a long jump and got these results (in meters): (Leaf unit = 0.1)

Stem	Leaf
2	3 5 5 7 8
3	2 6 6
4	5
5	0

   (a) What is the sample size?

   (b) Find the value of the longest and shortest jumps.

   (c) What is the shape of this distribution? (symmetrical, skewed to the left or skewed to the right?)

7. (2 points) The times required to service customers' cars at a repair shop are normally distributed with a mean of 3 hours and a standard deviation of 0.5 hour.

   (a) What can be said about the percentage of cars whose service time is between 2 hours and 4 hours?

   (b) If it takes 4.5 hours to service a customer, compute the z score.

8. (3 points) The following data represent the number of small cracks per bar for a sample of eight steel bars:

$$4, 6, 10, 1, 3, 1, 25, 8$$

(a) Find the median, first quartile(Q_1) and third quartile(Q_3) of small cracks per bar.

(b) Draw the box plot.

9. (1 point) You have three groups of distinctly different items, four in the first group, five in the second, and eight in the third. If you select one item from each group, how many different triplets can you form?

10. (1 point) In how many ways can a judge award first, second, and third prizes in a contest having eight contestants?

11. (1 point) A group has 12 men and 4 women. If 3 people are selected at random from the group, what is the probability that they are all men?

12. (3 points) Toss a fair coin three times. Define the event

    A: heads at least two times

    B: head on first toss

    (a) Find the sample space S.

    (b) List the event A and $A \cup B$.

    (c) Find $P(A|B)$.

13. (4 points) A researcher studied the relationship between the salary of a working woman with the number of children she had. The results are shown in the following probability table:

Salary	Number of children	
	Two or fewer children	More than two children
High salary	0.13	0.02
Medium salary	0.20	0.10
Low salary	0.30	0.25

    a) Find the probability that a working woman has a low salary.

b) Find the probability that a working woman has more than 2 children or has a high salary.

c) If a working woman has a low salary, what is the probability that she has 2 or fewer children?

d) Are High salary and Having more than 2 children independent or not?

14. (3 points)Let the random variable X be the weight gain (in pounds) per month for a calf. The probability distribution of X is shown below:

x	0	5	10	15
$P(X = x)$	0.1	0.5	0.3	0.1

a) Find the average weight gain in pounds per month for a calf.

b) Find the variance and standard deviation of the weight gain.

c) Find $P(X \leq 10)$

15. (3 points) The probability of a telesales representative making a sale on a customer call is 0.15.

a) Find the probability that no sales are made in 10 calls.

b) Find the probability that more than 3 sales are made in 5 calls.

c) Find the number of calls that need to be made by a representative to achieve a mean of at least 5 sales a day.

16. (1 point) In a marketing study, 16 children were to be randomly selected to try coconut-flavored gum. Assume the probability is 0.2 that a selected child will like the gum. Let X be number of children who like the gum. Give at least 2 reasons why the probability distribution $P(X = k), \quad (k = 0, 1, 2, ..., 16)$, is the binomial distribution.

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SCRATCH PAPER (You may tear it apart.)

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