



**Midterm Exam
First Semester 2017/2018**

Subject : **Statistics for Economic and Business (ECEU601200)**
Date : **Wednesday, October 25, 2017**
Time : **180 minutes**

Note: You may use calculator
The use of cellular phone for calculator is strictly prohibited
This set of problems is divided into five problems with similar contribution to the total mark

Problem I. For Question 1 – 14, select A or B or C or D for the most appropriate answer, and write down the letter on the answering sheet.

1. Respondents were asked, "Do you now earn more than or less than you did five years ago?"
What is this level of measurement?
 - A. Interval.
 - B. Ordinal.
 - C. Nominal.
 - D. Ratio.
2. A statistics class of 60 students evaluated the instructor using the following scale: excellent, good, average, poor, and inferior. The descriptive summary showed the following survey results: 2% excellent, 6% good, 40% average, 45% poor, and 7% inferior.
 - A. The instructor's performance was great!!!.
 - B. The instructor's performance was inferior.
 - C. Most students rated the instructor at most average..
 - D. No conclusions can be made.
3. For which of the following population parameters is sampling necessary?
 - A. The average height of Persija players.
 - B. The median age all student of FEBUI batch 2017.
 - C. The percentage of the FEB UI lecturers who have no car.
 - D. The average life of light bulbs produced by a manufacturer.
4. An experiment may have:
 - A. Only one outcome.
 - B. Only two outcomes.
 - C. Two or more outcomes.
 - D. Several outcomes.

5. A purchasing agent for a trucking company is shopping for replacement tires for their trucks from two suppliers. The suppliers' prices are the same. However, Supplier A's tires have an average life of 60,000 miles with a standard deviation of 10,000 miles. Supplier B's tires have an average life of 60,000 miles with a standard deviation of 2,000 miles.

Which of the following statements is true?

- A. The two distributions of tire life are the same.
B. On average, Supplier A's tires have a longer life than Supplier B's tires.
C. The life of Supplier B's tire is more predictable than the life of Supplier A's tires.
D. The dispersion of Supplier A's tire life is less than the dispersion of Supplier B's tire life.
6. A probability based on logical analysis rather than on observation or personal judgment is *best* referred to as a(an) _____.
- A. Subjective probability.
B. Empirical probability.
C. A priori (or classical) probability.
D. None of the above.
7. In a contingency table, we describe the relationship between
- A. two variables measured at the ordinal or nominal level.
B. two variables, one measured as an ordinal variable and the other as a ratio variable
C. two variables measured at the interval or ratio level
D. a variable measure on the interval or ratio level and time.
8. If two events are independent, then their joint probability is
- A. computed with the special rule of addition.
B. computed with the special rule of multiplication.
C. computed with the general rule of multiplication.
D. computed with Bayes theorem.
9. Which approach to probability assumes that the outcomes are equally likely?
- A. Classical
B. Empirical
C. Subjective
D. Mutually exclusive
10. Consider the following discrete probability distribution. What is the probability that X is greater than 2?

X	-3	-2	0	1	2
$P(X = x)$	0.15	0.25	0.10	0.30	0.20

- A. 0.15.
B. -0.15.
C. 0.
D. 0.20.

11. Besides measuring change in the prices of goods and services, the consumer price index has a number of other applications such as:
- To determine real disposable personal income.
 - To find the purchasing power of money income.
 - Establish cost of living increases.
 - All of the above.
12. Which of the following is an example of cross-section data?
- Nominal GDP of Indonesia in 2015 by province.
 - Real GDP of Indonesia in 2015 by main islands.
 - Quarterly housing price collected over the last 40 years.
 - A and B.
13. Which of the following correctly identifies the expression for calculating the inflation rate for period t , based on the CPI?
- $i_t = (CPI_{t-1} - CPI_t)/CPI_t$
 - $i_t = (CPI_{t-1} - CPI_t)/CPI_{t-1} \times 100$
 - $i_t = (CPI_t - CPI_{t-1})/CPI_{t-1}$
 - $i_t = (CPI_t - CPI_{t-1}) \times 100$
14. Which of the following sets of outcomes described below in I and II represent collectively exhaustive events?
- “Your final course grade is an A”, “Your final course grade is a B”.
 - “Your final course grade is an A”, “Your final course grade is a pass”.
- Neither I nor II represent collectively exhaustive events.
 - Both I and II represent collectively exhaustive events.
 - Only I represents collectively exhaustive events.
 - Only II represents collectively exhaustive events.

Give short answer to Question 15 – 20.

15. If the mean of a distribution is smaller than the median and mode, the distribution is _____ skewed.
16. A probability distribution is a listing of the expected outcomes of an experiment and the probability of each outcome occurring. What is the sum of the probabilities? _____
17. $P(A \cup B)$ for mutually exclusive events is _____.
18. The probability that a specific event will occur given that another specific event has occurred is _____ probability.

The following paragraph is for Question 19 and Question 20.

A company was studying the demographics of their customers. As part of the study they collected the following variables: gender, marital status, annual income, and age. Label each variable as (a) qualitative or quantitative, (b) discrete or continuous.

19. Gender: (a) _____, (b) _____.
 Marital Status: (a) _____, (b) _____.
20. Annual income: (a) _____, (b) _____.
 Age: (a) _____, (b) _____.

Problem II.

As a researcher, **Dr. Stem** disseminates data from Susenas 2015 (provided by *Biro Pusat Statistik*), and selects 128 households from Jawa Barat Province. **Dr. Stem** is interested in analysing monthly household expenditure on LPG (Liquefied Petroleum Gas) used for daily cooking. He had just constructed Stem-and-Leaf diagram from 113 household expenditures on LPG (in 000 rupiahs).

Sum	Freq	Stem	
211	13	1	0 1 6 6 6 6 6 7 7 9 9 9 9
301	12	2	0 1 1 2 4 4 7 7 8 9 9 9
1159	33	3	1 1 1 3 3 3 4 4 4 4 4 4 4 4 4 4 5 5 5 5 6 6 6 6 7 7 7 9 9 9 9 9
1012	23	4	0 0 0 1 1 1 2 2 2 3 3 3 4 4 4 6 6 7 8 8 9 9 9
743	14	5	0 0 0 1 1 1 3 3 3 3 6 6 7 9
319	5	6	0 2 5 6 6
595	8	7	0 0 3 3 5 7 8 9
256	3	8	0 8 8
0	0	9	
0	0	10	
115	1	11	5
125	1	12	5
4836	113		

Notes: Unit of Stem=10; unit of leaf=1;

The 15-remaining data had not been incorporated in the above stem-and-leaf display are as follows.

18 19 29 29 31 32 34 35 40 41 42 43 44 51 65; Sum = 553

As a research assistant to **Dr. Stem**, you are asked to conduct data analysis with detail task pointed in the following questions.

- Reconstruct a complete stem-and-leaf display by incorporating the additional 15-data!
(4)
- Find the Q1, median and Q3 and arithmetic mean from the complete data!
(4)
- Construct a box-plot diagram! Do you find any outlier's data? Show the calculation.
(4)
- If you want to compare the dispersion of data between those at stem 1 and stem 5, what is the best measure that should be used? Explain why!
(3)

- e. Based on (d), which stem has more diverse data? Show the calculation.
(5)

Problem III.

A survey using a bundle of three commodities was conducted to estimate the cost of living in a village area. The survey covered consumption (in kilogram) and price (in rupiah per kilogram).

Commodity	Consumption (C) and Price (P)					
	C 2014	P 2014	C 2015	P 2015	C 2016	P 2016
Rice	11	10	9	12	8	13
Sorghum	13	9	14	9	15	10
Sugar	15	15	13	18	10	23

Questions:

- Construct a price index using Laspeyres method with 2015 as a base year.
(4)
- Calculate the inflation rate for 2015 and 2016.
(3)
- Suppose the daily wage of a person in 2016 was Rp100,000. What was the purchasing power for that wage at 2016 compared to the same amount of wage at 2014?
(3)
- If the daily wage of a person in the village in 2016 was Rp500,000, what should be the wage in 2015 so that it had the same purchasing power?
(3)
- Calculate the rate of growth for consumption of each commodities 2014 – 2015 and 2015–2016.
(3)
- Based on (e), comment whether or not Laspeyres method is more suitable than Paasche method.
(4)

Problem IV.

The following table provided by the *Badan Pusat Statistik (BPS)* contains counts (in thousands) of civilian population of DKI Jakarta in February 2017. This population is classified by gender (male and female) and employment status (employed, unemployed (but looking for a job), and not-in-labor-force (not looking for a job)).

Labor Force in Jakarta, February 2017 (in thousand)

Gender	Employed	Unemployed	Not in Labor Force	Civilian Population
Male	3115	169	599	3883

Female	2054	124	1722	3900
Total	5169	293	2321	7783

Thus, Civilian Population consists *Labor Force* and *Not in Labor Force*; and the *Labor Force* consists of *Employed* and *Unemployed*.

1. Calculate the probability that a randomly chosen member of the civilian population is in Labor Force?
(3)
2. Suppose you are told that the randomly chosen person is Female. What is the probability that the person is employed?
(3)
3. What is the probability that the randomly chosen person is Not Unemployed?
(4)
4. What is the probability that a randomly selected person from the civilian population is Female and Employed?
(3)
5. What is the probability that the randomly selected person is Female or Not in Labor Force?
(3)
6. Show that gender and being in the labor force are not independent.
(4)

Problem V.

A survey was conducted on 300 soldiers to assess the effectiveness of shooting practice. Each soldier was given 6 bullets and was asked to shoot the target 6 times. The observations were limited to whether the shootings were on target (hits) or missed the target (misses). Distribution of the number of hits per soldier is presented in the table below.

Number of hits (per soldier)	Number of Soldiers
0	36
1	48
2	72
3	54
4	48
5	24
6	18
Total	300

Questions:

- a. Based on the data, using empirical concept of probability, construct a probability distribution for number of hits.
(4)
- b. Calculate the expected value of the probability distribution found in (a).
(3)
- c. Suppose the study is going to be used to model a theoretical probability distribution for the random variable number of bullets on target, i.e. binomial probability distribution. Explain what assumption should be met so that binomial probability distribution is suitable?
(4)
- d. Suppose the binomial distribution on (c) has also six shootings. Based on (c), what is the probability of a hit?
(2)
- e. Suppose it is applied to a 10 bullets for each soldier. What is the probability of having at most 2 hits out of 10 shots?
(4)
- f. Similar to (e), what is the probability of having at least 4 hits out of 10 shots?
(3)

Selected Formulas

$$s^2 = \frac{\sum (x_i - \bar{x})^2}{n-1} ; s^2 = \frac{\sum (m_i - \bar{x})^2 f_i}{n-1} ; \sigma^2 = \frac{\sum (x_i - \mu)^2}{N} ; \sigma^2 = \frac{\sum (m_i - \mu)^2 f_i}{N}$$

$$E(X) = \mu = \sum x_i P(X = x_i) ; Var(X) = \sigma^2 = \sum [(x_i - \mu)^2 P(X = x_i)]$$

$$P(X = x) = \binom{n}{x} \pi^x (1-\pi)^{n-x} ; E(X) = \mu_x = n\pi ; Var(X) = \sigma^2 = n\pi(1-\pi)$$

Kanopi FEBUI
Unity in Development