

MIDTERM EXAM
First Semester 2019/2020

Subject : **Statistics for Economics and Business (ECEU601200)**
Date : **Thursday, October 24th, 2019**
Time : **150 minutes**

Notes: You are allowed to use a calculator.

The use of mobile phones is not permitted and mobile phones must be switched off during the exam.

This set of problems is divided into four problems with an equal contribution to the total mark.

PROBLEM 1

In Funland, there are only three (3) kinds of goods consumed: popcorn, movie show, and diet drink. The following table shows the price (in thousand rupiah, P) and the amount consumed for these goods (Q) in 2008, 2018, and 2019.

Item	2008		2018		2019	
	P	Q	P	Q	P	Q
Popcorn (unit)	1	500	1	600	1,05	590
Movie show (unit)	5	300	10	200	10.50	210
Diet drink (unit)	0.70	300	0.80	400	0.75	420

Questions:

- (5 points)** Compute the Paasche Index in 2008, 2018, and 2019. Use 2008 as the base year. Interpret.
- (5 points)** If Annisa's income was Rp.500,000/month in 2008 and does not change in 2019, using the Paasche Index (answer for No. 1) as the Consumer Price Index, what is her real income in 2019?
- (5 points)** If you would like to calculate the purchasing power from that income in 2019 compared to in 2008, which price index should you use? Explain why.
- (5 points)** What is the inflation rate in 2019?
- (5 points)** What is the difference between the price index in 2019 (answer for No. 1) and the inflation rate in 2019 (answer for No. 4)?

PROBLEM 2

Now consumers can buy goods using two methods, online and offline. A survey was carried out to study the probability of someone buying goods using a certain method and the satisfaction perception of its shopping services. The results of the survey indicate that:

- the probability of someone buying goods through online shopping is 0.15;
- if someone buys goods through online shopping, the probability that the person feels satisfied with its shopping services is 0.8;
- if someone buys goods through offline shopping, the probability that the person feels satisfied with its shopping services is 0.9.

Questions:

- (10 points)** Draw a tree diagram to describe the above problem!
- (5 points)** What is the probability that someone buys goods through online shopping and feels unsatisfied with its shopping services?

3. **(10 points)** Someone feels satisfied with the shopping services, what is the probability that the person buys goods through online shopping? (Bayes Theorem)

PROBLEM 3

Investmee, an investor in financial sector has operational permit for 10 years. Investmee worries with monetary crisis during its operational permit because monetary crisis will affect its profit level. If there is no monetary crisis, its profit level, measured by return on assets (ROA), is estimated to be 30% yearly. However, if there is monetary crisis its profit level can only achieve 15% every year. The occurrence of monetary crisis in a year follows Bernoulli trials with two possible outcomes, “there is monetary crisis” and “there is no monetary crisis.” The probability of “there is monetary crisis” is 0.15 and the probability of “there is no monetary crisis” is 0.85. The occurrence of monetary crisis in a year is assumed to be independent with the occurrence of monetary crises in other years.

Questions:

1. **(5 points)** What is the probability of no monetary crisis during Investmee’s operational permit?
2. **(5 points)** What is the probability of that monetary crisis strikes two times during 10 years of Investmee’s operational permit?
3. **(5 points)** What is the probability of that monetary crisis strikes at most four (4) times during Investmee’s operational permit?
4. **(10 points)** What is the expected profit level (ROA) of Investmee during its operational permit?

PROBLEM 4

Budi is a fresh graduate from FEB that just received a reward of Rp.10 million from his parents for his graduation. He plans to invest on that money by buying stock. From daily data in the last year (October 8, 2018 – October 9, 2019), there are two stocks that he considers to buy with the following information.

Descriptive Statistics of Stock Price per Sheet

Statistic	PT Astra Agro Lestari Tbk (AALI) (rupiah)	PT Wijaya Karya (Persero) Tbk. (WIKA) (rupiah)
	Sector	
	Agriculture	Construction
Mean	11,260	1,926
Median	10,975	1,943
Quartile 1	10,475	1,690
Quartile 3	11,981	2,270
Mode	10,500	2,340
Standard deviation	992	383
Range	4,166	1,409
Minimum	9,750	1,081
Maximum	13,916	2,490
Observations	261	260

Source: <https://finance.yahoo.com/quote/AALI.JK/history?p=AALI.JK>
<https://finance.yahoo.com/quote/WIKA.JK/history?p=WIKA.JK&.src=fin-srch>

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Questions:

- A. If Budi's main choice is stock with AALI code in Agriculture sector, therefore based on the above table, answer the following questions:
1. **(5 points)** Determine the statistics to construct the **box plot** and construct the box plot for the AALI stock price!
 2. **(4 points)** Is the AALI stock price distribution symmetric? Give your arguments based on the boxplot you constructed!
 3. **(3 points)** If on a certain day, the AALI stock price rises to Rp.14,000 per stock, is this price an **outlier**? Identify using the **box plot** you constructed!
 4. **(3 points)** If the AALI stock price suddenly drops to Rp8,000 per stock, does this incident causes there is an **outlier** in the data?
- B. Budi is not yet sure with AALI stock choice. He considers to also choose WIKA stock in Construction sector.
1. **(5 points)** Based on the descriptive data in the Table above, is WIKA stock more risky (stock price more fluctuates) than AALI stock. Explain!
 2. **(5 points)** If Budi wants to buy both stocks where currently the price of AALI stock is Rp.12,000 per stock and the price of WIKA stock is Rp.2,500 per stock and the investment proportion for each stock is 40% and 60% respectively, what is the **weighted average** of both stocks?

ALL THE BEST

Selected Formulas

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

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

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

$$\bar{x} = \sum w_i x_i$$

$$P(B_i|A) = \frac{P(A|B_i)P(B_i)}{P(A|B_1)P(B_1) + P(A|B_2)P(B_2) + \dots + P(A|B_n)P(B_n)}$$