



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2017/2018**

COURSE NAME : STATISTICS FOR DECISION
MAKING

COURSE CODE : BWB 21503

PROGRAMME CODE : BWQ

EXAMINATION DATE : JUNE / JULY 2018

DURATION : 3 HOURS

INSTRUCTION : ANSWER ALL QUESTIONS

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

- Q1**
- (a) Define the concept of heuristics availability. (2 marks)
 - (b) When making decisions using heuristics approaches, the most common biases are associated with the availability heuristic. List **THREE (3)** types of availability heuristic biases. (3 marks)
 - (c) Based on **Q1(b)** above, describe **ONE (1)** example for each types of anchoring and adjustment heuristic biases. (6 marks)
 - (d) Differentiate **THREE (3)** categories of mental models. (6 marks)
 - (e) Describe **FIVE (5)** examples of when or where does intuition occurs in our daily life. (5 marks)
 - (f) List **THREE (3)** types of decision situation. (3 marks)

Q2 Amy Lloyd is interested in leasing a new Saab and has contacted three automobile dealers for pricing information. Each dealer has offered Amy a closed-end 36-month lease with no down payment due at the time of signing. Each lease includes a monthly charge and a mileage allowance. Additional miles will receive a surcharge on a per-mile basis. The monthly lease cost, the mileage allowance, and the cost for additional miles are shown in **Table Q2**.

Table Q2: Pricing information

Dealer	Monthly Cost	Mileage Allowance	Cost per Additional Mile
Forno Saab	\$299	36,000	\$0.15
Midtown Motors	\$310	45,000	\$0.20
Hopkins Automotive	\$325	54,000	\$0.15

Amy has decided to choose the lease option that will minimize her total 36-month cost. The difficulty is that Amy is not sure how many miles she will drive over the next three years. For purposes of this decision she believes it is reasonable to assume that she will drive 12,000 miles per year, 15,000 miles per year, or 18,000 miles per year. With this assumption Amy has estimated her total costs for the three lease options. For example, she figured out that the Forno Saab lease will

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cost her \$10,764 if she drives 12,000 miles per year, \$12,114 if she drives 15,000 miles per year, or \$13,464 if she drives 18,000 miles per year.

- (a) Name the decision alternative and state of nature in this situation. (2 marks)
- (b) Construct a payoff table for Amy's problem. (4 marks)
- (c) If Amy has no idea on which of the three mileage assumptions is most appropriate, give the recommended decision (leasing option) using the Optimism, Pessimism, Lost Opportunity (Regret), and Average Outcome (Rationality) approaches. (14 Marks)
- (d) Suppose that the probabilities that Amy drives 12,000, 15,000, and 18,000 miles per year are 0.5, 0.4 and 0.1, respectively. Choose which option Amy should select by using expected value approach. (5 marks)

- Q3** (a) One medicine bag contains 2 bottles of panadol and 3 bottles of vitamin tablets. A second medicine bag contains 1 bottle of panadol, 4 bottles of vitamin and 2 bottles of painkiller. If a bottle is taken at random from each bag, calculate the probability that
- (i) both bottles contains panadol.
 (ii) the two bottles contain different tablets,
 (iii) neither bottle contains vitamin. (8 marks)

- (b) In certain company, three machines (B_1 , B_2 and B_3) will make 25%, 35% and 30%, respectively, of the product. It is known from the past experience that 1%, 3% and 2% of the products made by each machine, respectively are defective. Now, suppose that a finished product is randomly selected. Construct a tree diagram and calculate the probability that it is defective. (7 marks)

- (c) Suppose that you are given a decision situation with three possible states of nature: s_1 , s_2 , and s_3 . The prior probabilities are $P(s_1) = 0.2$, $P(s_2) = 0.5$ and $P(s_3) = 0.3$. With sample information I , $P(I | s_1) = 0.1$, $P(I | s_2) = 0.05$ and $P(I | s_3) = 0.2$, compute the revised or posterior probabilities for $P(s_1 | I)$, $P(s_2 | I)$ and $P(s_3 | I)$. (9 marks)

Q4 The Gorman Manufacturing Company must decide whether to manufacture a component part at Milan plant or purchase the component part from a supplier. The resulting profit is dependent upon the demand for the product. **Table Q4** shows the projected profit (in \$000s). The state-of-nature probabilities are $P(s_1) = 0.35$, $P(s_2) = 0.35$ and $P(s_3) = 0.30$.

Table Q4: Payoff Table

Decision Alternatives	States of Nature		
	Low Demand, s_1	Medium Demand, s_2	High Demand, s_3
Manufacture, d_1	- 20	40	100
Purchase, d_2	10	45	70

- (a) Recommend the best decision using a decision tree approach. (3 marks)
- (b) Determine whether Gorman should attempt to obtain a better estimate of demand using EVPI value. (4 marks)
- (c) A test market study of the potential demand for the product is expected to report either a favorable (F) or unfavorable (U) condition. The relevant conditional probabilities are as follows:

$$\begin{aligned}
 P(F | s_1) &= 0.10 & P(U | s_1) &= 0.90 \\
 P(F | s_2) &= 0.40 & P(U | s_2) &= 0.60 \\
 P(F | s_3) &= 0.60 & P(U | s_3) &= 0.40
 \end{aligned}$$

- Calculate the probability that the market research report will be favorable. (5 marks)
- (d) Point out the optimal decision strategy for Gorman company. (4 marks)
- (e) Calculate the expected value of the market research information. (5 marks)
- (f) Calculate the efficiency of the information. (4 marks)



- END OF QUESTIONS -