BSTA 320 – TEST 1 FORMULA SHEET

Decision Under Uncertainty

Maximax

Maximin

Equally Likely (Laplace)

Criterion of Realism (Hurwicz):

$\alpha \times$ (best payoff for an alternative) + $(1 - \alpha) \times$ (worst payoff for the alternative)

Minimax Regret

Decision Making Under Risk

(Outcomes are also known as States of Nature)

Expected Monetary Value

EMV = (payoff of first outcome) × (probability of first outcome)
+ (payoff of second outcome) × (probability of second outcome)
+… + (payoff of last outcome) × (probability of last outcome)

Expected Opportunity Loss

EOL = (regret of first outcome) × (probability of first outcome)
+ (regret of second outcome) × (probability of second outcome)
+… + (regret of last outcome) × (probability of last outcome)

Expected Value with Perfect Information

EVwPI = (best payoff of the first outcome) × (probability of first outcome)
+ (best payoff of the second outcome) × (probability of second outcome)
+… + (best payoff of the last outcome) × (probability of last outcome)

Expected Value of Perfect Information

EVPI = EVwPI – Max EMV

Max EMV: The expected value without information.

Decision Making with Sample Information

Expected Value of Sample Information

$$\text{EVSI} = \begin{pmatrix} \text{expected value of best decision} \\ \text{with sample information,} \\ \text{assuming no cost to gather it} \end{pmatrix} - \begin{pmatrix} \text{expected value of} \\ \text{best decision without} \\ \text{sample information} \end{pmatrix}$$

$$= \text{EVwSI} - \text{Max EMV}$$

Efficiency = $\dfrac{EVSI}{EVPI}$

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***Table*: Computation of Posterior Probabilities**

(1) Outcome	(2) Prior Probabilities	(3) Conditional Probabilities	(4) Joint Probabilities (2) x (3)	(5) Posterior Probabilities (4) /∑(4)

BAYES' THEOREM (for calculation of Posterior Probabilities)

The probability of event B_i given that event A has occurred is given by the formula

$$P(B_i|A) = \frac{P(B_i)P(A|B_i)}{P(B_1)P(A|B_1)+P(B_2)P(A|B_2)+\cdots+P(B_k)P(A|B_k)}$$

where $B_1, B_2, \cdots, B_k$ are **mutually exclusive** and **collectively exhaustive** events.

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