Week 4/5
Term 1
2024

HAWKER COLLEGE

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Learning Brief

MM1

Goals

By the end of this fortnight, you will:

- Review probability as a measure of 'the likelihood of occurrence' of an event
- Review the probability scale: $0 \leq P(A) \leq 1$ for each event A, with $P(A) = 0$ if A is an impossibility and $P(A) = 1$ if A is a certainty
- Review the rules: $P(A') = 1 - P(A)$ and $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
- Use the notation $P(A|B)$ and the formula $P(A \cap B) = P(A|B)P(B)$
- Understand the notion of independence of an event A from an event B, as defined by $P(A|B) = P(A)$
- Establish and use the formula $P(A \cap B) = P(A)P(B)$ for independent events A and B, and recognise the symmetry of independence
- Use relative frequencies obtained from data as point estimates of conditional probabilities and as indications of possible independence of events

Theoretical Components

Knowledge Checklist:

- Define experiment, outcome, event, probability and equally likely
- Recognise the difference between outcomes that are equally likely and not equally likely to occur
- Determine the probability of simple and compound events
- Use tree diagrams to determine the sample space of compound events
- Use Venn diagrams to determine the probability of compound events
- Use Karnaugh Maps to determine the sample space of compound events
- Use the addition principle to compute probabilities of mutually exclusive (and non-mutually exclusive or inclusive) events
- Understand the definition of conditional probability
- Use the relative frequency approach to assigning probability to find the conditional probability of an event from a two-way table
- Use the formula for conditional probability
- Use the multiplication rule to find the probability of the intersection of two events
- Use the multiplication rule to find the probability of the intersection of more than two events
- Determine if two events are independent

Online Links

- https://www.khanacademy.org/math/probability/probability-and-combinatorics-topic/probability_combinatorics/v/events-and-outcomes-3
- https://www.khanacademy.org/math/probability/probability-and-combinatorics-topic/probability_combinatorics/v/getting-exactly-two-heads-combinatorics
- https://www.khanacademy.org/math/probability/probability-and-combinatorics-topic/probability_combinatorics/v/probability-using-combinations
- https://www.khanacademy.org/math/probability/probability-and-combinatorics-topic/probability_combinatorics/v/probability-using-combinations

Practical Components

Resources:

Make notes on the following chapters and websites:

- 11C Tree diagrams and lattice diagrams
- 11D The Addition Law of Probabilities
- 11E Karnaugh maps and probability tables
- 12H Applications to probability
- 11F Conditional probability
- 11H Independent events

Do the following questions:

Organise your solutions neatly in your exercise book. Chapters 11 and 12 of Maths Quest 11 Mathematical Methods (pdf – Google Classroom)

- 11C: 1, 3, 7, 11, 15, 17, 22
- 11D: 1, 3, 5, 11, 13, 15, 20, 24
- 11E: 1a, 1c, 5, 7, 8, 10, 12, 13, 15
- 12H: 1-7, 12-18
- 11F: 1, 3, 5, 9-12, 14, 15, 17, 19
- 11H: 1a, e, 2, 3, 5, 9, 16, 18

Investigation

See next page

Other

In-class task is in Week 6:

- Line 1: Thursday during Line 8
- Line 3: Wednesday during double lesson
- Line 4: Friday during double lesson
- Line 7: Thursday during double lesson

Week 4 and 5 Investigation

The purpose of this task is to find a rule for calculating $P(A\ and\ B)$ for two events A and B. suppose a coin is tossed and a die is rolled at the same time. The results of the coin toss will be called outcome A, and the result of the die roll will be outcome B.

a. Draw up a tree diagram to show all the outcomes.
b. Copy and complete the table:

	$P(A\ and\ B)$	$P(A)$	$P(B)$
$P(\text{a head and a 4})$			
$P(\text{a head and an odd number})$			
$P(\text{a tail and a number larger than 1})$			
$P(\text{a tail and a number less than 1})$			

c. What is the connection between $P(A\ and\ B)$, $P(A)$ and $P(B)$?