

OCR A-Level Computer Science: Boolean Algebra Practice
Assessment

Time Allowed: 45 minutes Total Marks: 40

*Answer **ALL** questions.*

Grade Boundaries:

- A Grade: 32-40 marks
- B Grade: 25-31 marks
- C Grade: 18-24 marks
- D Grade: 11-17 marks
- E Grade: 0-10 marks

Question 1: Simplify the following Boolean expression using Boolean algebra laws.
Show all your working steps.

$$A \cdot (B + \overline{B})$$

[5 marks]

Question 2: Given the truth table below:

A	B	C	Output
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	0

Write the minimal Sum of Products (SOP) expression for this truth table. [8 marks]

Question 3: Explain the difference between a canonical and minimal Boolean expression.
Provide an example to illustrate your explanation. [7 marks]

Question 4: Using Karnaugh maps, derive the minimal Boolean expression for the following function:

$$f(A, B, C, D) = \sum m(0, 1, 2, 4, 5, 6, 12, 13, 14)$$

Clearly show your working and map. [10 marks]

Question 5: Describe two practical applications of Boolean algebra in digital circuit design. For each application, explain how Boolean algebra principles are used to solve real-world computational problems. [10 marks]

End of Examination