

6 (a) The Karnaugh map (K-map) represents a logic circuit with four inputs.

		AB			
		00	01	11	10
CD	00	0	0	0	0
	01	1	1	1	0
	11	0	1	1	1
	10	0	0	1	1

- (i) Draw loop(s) around appropriate group(s) in the K-map to produce an optimal sum-of-products.

[3]
- (ii) Write the Boolean expression from your answer to part a(i) as a simplified sum-of-products. Do **not** carry out any further simplification.

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..... [2]

(b) Simplify the following expression using De Morgan’s laws and Boolean algebra.

Show all the stages in your simplification.

$$X = \overline{A+B+C} + \overline{\overline{B}+C}$$

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..... [3]