



1.4.3 Karnaugh Maps

Q1

Find the Boolean expression represented in the Karnaugh Map below. Show your working.

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

[5 marks]

- $(A \wedge \neg B) \vee (A \wedge \neg C) \vee (\neg C \wedge \neg D)$

Q2

a) Complete the Karnaugh map below for the Boolean expression $(\neg A \wedge \neg B) \vee (A \wedge \neg B)$.

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

[3 marks]

b) Use the Karnaugh map to find a simplified Boolean expression that is equivalent to $(\neg A \wedge \neg B) \vee (A \wedge \neg B)$.

[2 marks]

- $\neg B$





Q3

Find the Boolean expression represented in the Karnaugh Map below. Show your working.

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

[4 marks]

- $(\neg A \wedge \neg C) \vee (A \wedge \neg D)$

Q4

Find the Boolean expression represented in the Karnaugh Map below. Show your working.

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

[4 marks]

- $(A \wedge \neg D) \vee (B \wedge \neg C)$





Q5

Find the Boolean expression represented in the Karnaugh Map below. Show your working.

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

[4 marks]

- $(\neg A \wedge \neg D) \vee (A \wedge B \wedge C) \vee (A \wedge \neg B \wedge \neg C \wedge \neg D)$

Q6

Find the Boolean expression represented in the Karnaugh Map below. Show your working.

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

[4 marks]

- $B \vee \neg C$





Q7

Complete the Karnaugh map below to simplify the Boolean expression:

$$Q = (A \wedge \neg B) \vee (\neg A \wedge C \wedge D) \vee (A \wedge B).$$

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

[4 marks]

- $A \vee (C \wedge D)$

Q8

Complete the Karnaugh map below to simplify the Boolean expression:

$$Q = (\neg C \wedge D) \vee (\neg C \wedge \neg D) \vee (A \wedge \neg B \wedge C).$$

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

[4 marks]

- $\neg C \vee (A \wedge \neg B)$





Q9

Complete the Karnaugh map below to simplify the Boolean expression:

$$(A \wedge B) \vee (\neg A \wedge B) \vee (\neg C \wedge \neg D).$$

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

[4 marks]

- $B \vee (\neg C \wedge \neg D)$

Q10

Draw the logic gates represented by the Karnaugh Map below. Show your working.

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

[4 marks]

- $(\neg A \wedge \neg C) \vee (A \wedge C)$



