0 1 . 1 Using the rules of Boolean algebra, simplify the following expression.

$$\overline{\overline{A \cdot (\overline{B} + 0)} \cdot \overline{\overline{A} \cdot (B + B)}}$$

You **must** show your working.

[4 marks]

Answer _____

0 2 . 1 De Morgan's laws can be applied to enable a combination of logic gates to be replaced by a single gate that produces the same output.

What single gate could replace the combination of gates in the expression $\overline{\overline{A} \cdot \overline{B}}$?

[1 mark

0 2 . 2 Using the rules and identities of Boolean Algebra, simplify the following Boolean expression.

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

[4 marks]

0 3 . 1 Using the rules and identities of Boolean algebra, simplify the following Boolean expression.

$$\overline{\overline{A + B \cdot \overline{\overline{B}} + C \cdot A}}$$

You **must** show your working.

[4 marks]

Answer

0 4 . 1 Complete the truth table below.

$\mathbf{A}$	$\mathbf{B}$	$\overline{\mathbf{B}}$	$\left(\mathbf{A}+\overline{\mathbf{B}}\right)$	$\left(\mathbf{A}+\overline{\mathbf{B}}\right)\cdot\mathbf{B}$
0	0			
0	1			
1	0			
1	1			

Using the final column, give a simplified Boolean expression for

$$\left(\mathrm{A}+\overline{\mathrm{B}}\right)\cdot\mathrm{B}$$

[3 marks]

Answer _____

0 4 . 2 Using the rules and identities of Boolean algebra, simplify the following Boolean expression.

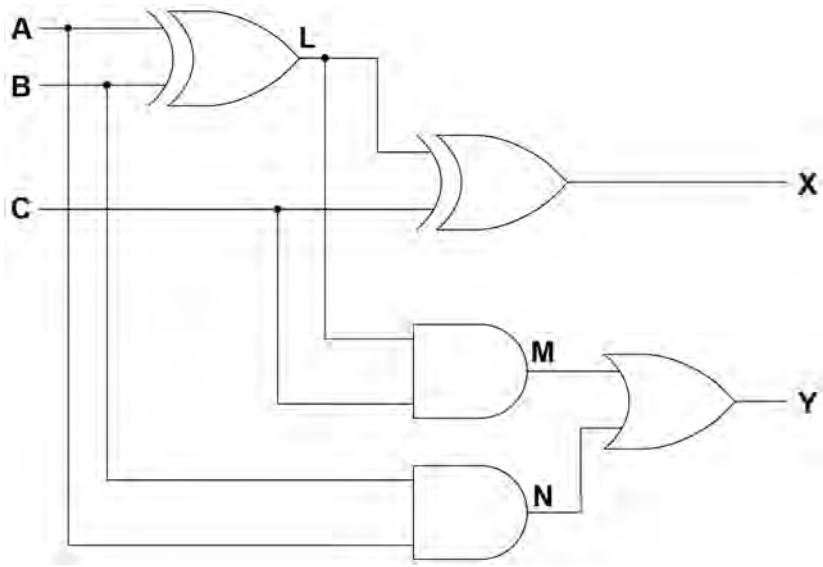
$$\left(A + \overline{B}\right) \cdot \left(\overline{\overline{A} + B}\right)$$

[4 marks]

Answer

0 5 . 1 **Figure 3** shows a circuit diagram.

Figure 3



Complete the truth table below for the circuit shown in **Figure 3**.

[3 marks]

A	B	C	L	M	N	X	Y
0	0	0		0		0	
0	0	1		0		1	
0	1	0		0		1	
0	1	1		1		0	
1	0	0		0		1	
1	0	1		1		0	
1	1	0		0		0	
1	1	1		0		1	

0 5 . 2 Using **Figure 3**, write a Boolean expression for output **Y** in terms of inputs **A**, **B** and **C**.
[2 marks]

Y = _____

0 5 . 3 Using the rules of Boolean algebra, simplify the following expression.

$$\overline{\overline{A} + \overline{B}} + B \cdot \overline{A} \cdot \left(\overline{C} + C\right)$$

You **must** show your working.
[4 marks]

0 6 . 1 Using the rules of Boolean algebra, simplify the following expression.

$$\overline{W} \cdot X \cdot Z + W \cdot Z + X \cdot Y \cdot \overline{Z} + \overline{W} \cdot X \cdot Y \cdot 1$$

You **must** show your working.

[4 marks]

Final answer _____