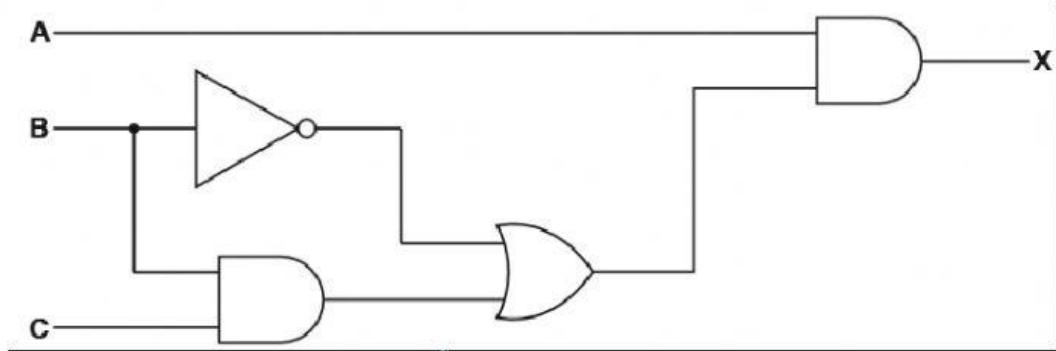


### K-map

Consider the following logic circuit, which contains a redundant logic gate.



(a) Write the Boolean algebraic expression corresponding to this logic circuit.

$$X = \dots \quad [3]$$

(b) Complete the truth table for this logic circuit.

A	B	C	Working space	X
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

[2]

(c) (i) Complete the Karnaugh Map (K-map) for the truth table in part (b).

		AB					
		00	01	11	10		
C	0						
	1						

The K-map can be used to simplify the expression in part (a).

(ii) Draw loop(s) around appropriate groups to produce an optimal sum-of-products.  
[2]

(iii) Write a simplified sum-of-products expression, using your answer to part (ii).

$$X = \dots \quad [2]$$

(d) One Boolean identity is:

$$A + \bar{A} \cdot B = A + B$$

Simplify the expression for  $X$  in part (a) to the expression for  $X$  in part (c)(iii). You should use the given identity.

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