Simplify Boolean expression 12

Challenge 2

Using the laws of Boolean algebra, simplify this Boolean expression:

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

What does the expression simplify to?

- $A \wedge B \vee C$
- $\neg A \wedge B \vee C$
- False (0)
- $A \wedge B \vee \neg C$

Simplify Boolean expression 10

Challenge 2

A Boolean expression can often be expressed using different logic, often in much simpler form.

Three of the following Boolean expressions are correct (in that the left part has the same logic as the right part). Select the **three** correct options.

- [ ] $A \vee 1 = 1$
- [ ] $A \vee B = \neg(\neg A \wedge \neg B)$
- [ ] $A \wedge 1 = 1$
- [ ] $A \wedge (A \vee B) = B$
- [ ] $A \wedge \neg A = 1$
- [ ] $A \wedge (A \vee B) = A$

Quiz:
STEM SMART Computer Science Week 32

De Morgan's Laws 4

Challenge 2

In a test, the students are asked to use the De Morgan's 1st Law to simplify the following Boolean expression:

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

One example of simplification was given:

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

$A \wedge B \vee B \wedge \neg A$

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

B

Select the option below that correctly used De Morgan's 1st Law to simplify the Boolean expression above:

- $\neg(\neg A \vee \neg B) \vee B \wedge \neg A$
  $\neg(\neg(\neg A \vee \neg B) \wedge \neg(B \wedge \neg A))$
  $\neg(\neg(\neg A \vee \neg B) \wedge (\neg B \vee A))$
  $\neg A \wedge \neg B \vee \neg A \wedge A \vee \neg B \wedge \neg B \vee \neg B \wedge A$
  $\neg A \wedge \neg B \vee 0 \vee \neg B \vee \neg B \wedge A$
  $\neg B \wedge (1 \vee 1)$
  $\neg(\neg B)$
  B

- $\neg(\neg A \vee \neg B) \vee B \wedge \neg A$
  $\neg(\neg(\neg A \vee \neg B) \wedge \neg(B \wedge \neg A))$
  $\neg(\neg(\neg A \vee \neg B) \wedge (\neg B \vee A))$
  $\neg(\neg A \wedge \neg B \vee \neg A \wedge A \vee \neg B \wedge \neg B \vee \neg B \wedge A)$
  $\neg(\neg A \wedge \neg B \vee 0 \vee \neg B \vee \neg B \wedge A)$
  $\neg(\neg B \wedge (1 \vee 1))$
  $\neg(\neg B)$
  B

Quiz:

De Morgan's Laws 2

Challenge 1

Some Boolean expressions can be manipulated using De Morgan's laws. The expression below can be tackled in this way.

$\neg(\neg B \wedge \neg(\neg B \wedge A))$

Which of the following options shows a correct application of De Morgan's laws?

- $\neg B \vee A \vee B$
- $\neg B \vee A \wedge B$
- $\neg B \wedge A \vee B$
- $B \wedge A \vee B$

Quiz:
STEM SMART Computer Science Week 32

Simplify the Karnaugh map 4

Challenge 2

A Karnaugh map has been drawn as shown in **Figure 1** and the three blocks of 1s have been correctly identified.

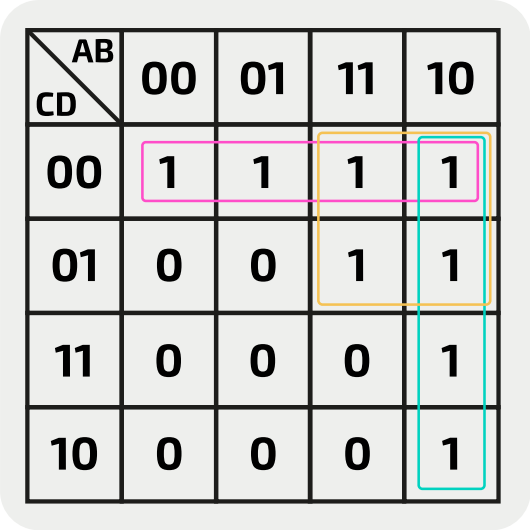

Figure 1
A four-input Karnaugh map

The expression for the pink block is $\neg C \wedge \neg D$ and the expression for the blue block is $A \wedge \neg B$. What is the expression for the orange block?

Write the simplest Boolean expression to represent the given Karnaugh map.

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

Quiz:
STEM SMART Computer Science Week 32

Simplify the Karnaugh map 1

Challenge 2

The truth table for a Boolean expression has been put into the Karnaugh map shown in **Figure 1**.

A / B	0	1
0	0	1
1	1	1

Figure 1
A two-input Karnaugh map

Choose the simplest Boolean expression to represent the given Karnaugh map.

- $\neg A \vee \neg B$
- $A \wedge B$
- $A \vee B$
- $A \veebar B$

Quiz:
STEM SMART Computer Science Week 32

Simplify the Karnaugh map 2

Challenge 2

The truth table for a Boolean expression has been put into the Karnaugh map shown in **Figure 1**.

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

Figure 1
A four-input Karnaugh map

Write the simplest Boolean expression to represent the given Karnaugh map

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

Quiz:
STEM SMART Computer Science Week 32

Simplify the Karnaugh map 3

Challenge 2

The truth table for a Boolean expression has been put into the Karnaugh map shown in **Figure 1**.

C \ AB	00	01	11	10
0	0	1	1	1
1	0	1	1	0

Figure 1
A three-input Karnaugh map

Write the simplest Boolean expression to represent the given Karnaugh map.

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