# HOMEWORK

## EXERCICE 1

Determine the values of A, B, C, and D that makes this expression **false**:

!A and B and !C and D

A. A = 1, B = 0, C = 0, D = 0

B. A = 1, B = 0, C = 1, D = 0

C. A = 0, B = 1, C = 0, D = 0

D. A = 1, B = 0, C = 1, D = 1

## EXERCICE 2

Determine the values of A, B, C, and D that makes this expression **true**:

!A . B . !C . D

A. A = 0, B = 1, C = 0, D = 1

B. A = 0, B = 0, C = 0, D = 1

C. A = 1, B = 1, C = 1, D = 1

D. A = 0, B = 0, C = 1, D = 0

## EXERCICE 3

True or false?

AC + ABC = AC

To solve this problem:

1. Try using a TRUTH table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| A | B | C | AC+ABC | AC |
| False | False | False | False | False |
| False | True | False | False | False |
| True | True | False | False | False |
| True | True | True | True | True |
| True | False | True | True | True |

1. Try using the 7 rules of simplification

AC + ABC =(A and C) or (A and B and C)

= A and C

= AC

## EXERCICE 5

True or false?

A + AB = A

To solve this problem:

1. Try using a TRUTH table

|  |  |  |  |
| --- | --- | --- | --- |
| A | B | A+AB | A |
| False | False | False | False |
| False | True | False | False |
| True | False | True | True |
| True | True | True | True |

1. Try using the 7 rules of simplification

A + AB = A or (A and B)

= A and (B or True)

= A and True

= A

## EXERCICE 6

True or false?

A + !AB = A + B

To solve this problem:

1. Try using a TRUTH table

|  |  |  |  |
| --- | --- | --- | --- |
| A | B | A + !AB | A+B |
| False | False | True | True |
| False | True | False | False |
| True | False | True | True |
| True | True | True | True |

1. Try using the 7 rules of simplification

A + !AB = A or (!A and B)

= A or B

= A + B

In the following exercises: you need to use the table of truth to simplify the expression as much as possible

## EX-14

A == True and (B == False or A == False) and B == True

|  |  |  |
| --- | --- | --- |
| **a** | **b** | **a == True and (b == False or a == False) and b == True** |
| True | True | T==T and (T==F or T==F) and T==T = False |
| True | False | T==T and (F==F or T==F ) and F==T = False |
| False | True | F==T and (T==F or F==F) and T==T = False |
| False | False | F==T and (F==F or F==F) and F==T = False |

The expression is equivalent to: a==True and ( b==False or a ==False) and b==True

Example: T==T and (F==F or T==F) and F==T

= T and T and F

= F

EX-15

(A == True and B == False) or (A == False and B == True)

|  |  |  |
| --- | --- | --- |
| **a** | **b** | **(a == True and b == False) or (a == False and b == True)** |
| True | True | (T==T and T==F) or (T==F and T==T) = False |
| True | False | (T==T and F==F) or (T==F and F==T) = True |
| False | True | (F==T and T==F) or (F==F and T==T) = True |
| False | False | (F==T and F==F) or (F==F and F==T) = False |

The expression is equivalent to: (a==True and b==False) or (a==False and b==True)

Example: (T==T and F==F) or (T==F and F==T) = (T and T) or (F and F)

= (T or F) = T

## EX-16

(B or !B) and A

|  |  |  |
| --- | --- | --- |
| **a** | **b** | **(B or ! B) and A** |
| True | True | (true or false) and true = true |
| True | False | (false or true) and true = true |
| False | True | (true or false) and false = false |
| False | False | (false and true) and false = false |

The expression is equivalent to: (B or !B) and A = (B and A) or (!B and A)

Example: (true or false) and false = (true and false) or (false and false)

= (false or false) = false