# C3- S3 EXERCICES

SIMPLIFICATIONS

In the following exercises:

1. Demonstrate this equality using the 9 simplification rules you have learnt
2. Confirm this equality with the TRUTH table

EX-7

A and (A or B) = A

1 . Demostrate by using spcifitcation

​​​ A AND (A or B) = (A AND A) OR (A AND B)

= A OR ( A AND B)

= A AND ( B OR TRUE)

= A AND TRUE

2.using table

|  |  |  |
| --- | --- | --- |
| A | b | A and (A or B) |
| false | false | False |
| true | false | true |
| false | true | false |
| True | True | True |

EX-8

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

1. Using secification

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

= A and (B or true)

= A and true

= A

1. Using table spcification

|  |  |  |
| --- | --- | --- |
| A | B | (A and B) or (A and !B) |
| False | False | False |
| True | False | True |
| False | True | False |
| True | True | True |

EX-9

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

1. Using spcification

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

= False or ( A and B)

= A and B

|  |  |  |  |
| --- | --- | --- | --- |
| A | B | A and ( !A or B) | A and B |
| False | False | False | False |
| True | False | True | True |
| False | True | False | False |
| True | True | True | True |

EX-10

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

1. Using spciafication

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

= false and (A or B)

= A or B

1. Using truth table

|  |  |  |  |
| --- | --- | --- | --- |
| A | B | A or (!A and B) | A or B |
| False | False | False | False |
| False | True | True | True |
| True | False | True | True |
| True | True | True | True |

EX-11

A or (A and B) = A

1. Using spcificaion

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

= A or True

Or = (A or A) and (A or B)

EX-12

! ( !C and (!B or !C) ) = C

1. Using 9 spcificaion

!(!C and( !B or!C) = !((!C and !B) or ( !C and !C)

= !((!C and !B) or !C)

= !(!C and ( !B or True))

= !(!C and True)

=!(!C)

= C

1. Using truth table

|  |  |  |
| --- | --- | --- |
| B | C | !(!C and (!B or !C)) |
| False | False | False |
| False | True | True |
| True | False | False |
| True | True | True |

TABLE OF TRUTH

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

## EX-13

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

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

The expression is equivalent to:

Answer 1:

(A and B) or (!A and !B)

Answer 2 :

A==B