# 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. Using the 9 simplification

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

= A

1. Using Truth table

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

EX-8

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

1. Using the 9 simplification

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

= (A and B) or A

= A and (B or True)

= A and true

= A

1. Using Truth table

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

EX-9

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

1. Using the 9 simplification

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

= False or (A and B)

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

=A and B

1. Using Truth table

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

EX-10

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

1. Using the 9

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

= A or (B and B)

= A or B

= A +B

1. Using Truth table

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

EX-11

A or (A and B) = A

1. Using the 9 simplification

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

= A and A

=A

1. Using Truth table

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

EX-12

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

1. Using the 9 simplification

!(!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 |
| True | False | False |
| False | True | True |
| 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 | False |  |
| False | True |  |
| False | False |  |

The expression is equivalent to: