# 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. Demonstrate this equality using the 9 simplification rules you have learnt  
   A and (A or B) = (A and A) or (A and B) DISTRIBUTIVITY

= A or (A and B)

= A and (B or True) *FACTORISATION*

= A and True

= A

1. 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. Demonstrate this equality using the 9 simplification rules you have learnt

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

= A and True

= A

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

EX-9

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

1. Demonstrate this equality using the 9 simplification rules you have learnt

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 |
| False | True | False | False |
| True | False | False | False |
| True | True | True | True |

EX-10

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

1. Demonstrate this equality using the 9 simplification rules you have learnt

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

= True and (A or B)

= A or B

|  |  |  |  |
| --- | --- | --- | --- |
| **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. Demonstrate this equality using the 9 simplification rules you have learnt

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

= A and True

= True

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

EX-12

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

1. Demonstrate this equality using the 9 simplification rules you have learnt

! ( !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

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

The expression is equivalent to:

Answer1:

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

Answer2:

**A ==B**