**Comprovação das propriedades: comutativa, associativa e distributiva.**

**Comprovação da regra de precedência das operações lógicas**

Nota o símbolo **≡** significa equivalente

**Comprovação da propriedade comutativa**

a) Preenche as tabelas de verdade

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **Propriedade comutativa na adição:**  |
| 22=4 | Entradas |  |
| **A** | **B** | **A+B** | **B+A** |
| 0 | 0 | 0 |  |  |
| 1 | 0 | 1 |  |  |
| 2 | 1 | 0 |  |  |
| 3 | 1 | 1 |  |  |

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| **Propriedade comutativa na Multiplicação:**  |
| 22=4 | Entradas |  |
| **A** | **B** | **A.B** | **B.A** |
| 0 | 0 | 0 |  |  |
| 1 | 0 | 1 |  |  |
| 2 | 1 | 0 |  |  |
| 3 | 1 | 1 |  |  |

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b) Desenha e testa os circuitos no logisim.

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| **Propriedade comutativa na adição:** |  | **Propriedade comutativa na Multiplicação:** |
| **A+B** | **≡** | **B+A** |  | **A.B** | **≡** | **B.A** |
|  | **≡** |  |  |  | **≡** |  |

**Comprovação da propriedade associativa**

a) Preenche as tabelas de verdade

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **Propriedade associativa na adição:**  |
| 23=8 | Entradas |  |  |
| **A** | **B** | **A + (B + C)** | **(A + B) + C** | **A + B + C** |
| 0 | 0 | 0 |  |  |  |
| 1 | 0 | 1 |  |  |  |
| 2 | 1 | 0 |  |  |  |
| 3 | 1 | 1 |  |  |  |
| 4 | 0 | 0 |  |  |  |
| 5 | 0 | 1 |  |  |  |
| 6 | 1 | 0 |  |  |  |
| 7 | 1 | 1 |  |  |  |

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| **Propriedade associativa na Multiplicação:**  |
| 23=8 | Entradas |  |  |
| **A** | **B** | **A . (B . C)** | **(A . B) . C** | **A . B . C** |
| 0 | 0 | 0 |  |  |  |
| 1 | 0 | 1 |  |  |  |
| 2 | 1 | 0 |  |  |  |
| 3 | 1 | 1 |  |  |  |
| 4 | 0 | 0 |  |  |  |
| 5 | 0 | 1 |  |  |  |
| 6 | 1 | 0 |  |  |  |
| 7 | 1 | 1 |  |  |  |

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b) Desenha e testa os circuitos no logisim.

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| **Propriedade associativa na adição:** |
| **A + (B + C)** | **≡** | **(A + B) + C** | **≡** | **A + B + C** |
|  | **≡** |  | **≡** |  |
| **Propriedade associativa na Multiplicação:** |
| **A . (B . C)** | **≡** | **(A . B) . C** | **≡** | **A . B . C** |
|  | **≡** |  | **≡** |  |

**Comprovação da propriedade distributiva A. (B + C)= A . B + A . C**

a) Preenche as tabelas de verdade

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **Propriedade distributiva** |
| 23=8 | Entradas |  |
| **A** | **B** | **A. (B + C)** | **A . B + A . C** |
| 0 | 0 | 0 |  |  |
| 1 | 0 | 1 |  |  |
| 2 | 1 | 0 |  |  |
| 3 | 1 | 1 |  |  |
| 4 | 0 | 0 |  |  |
| 5 | 0 | 1 |  |  |
| 6 | 1 | 0 |  |  |
| 7 | 1 | 1 |  |  |

 |  | b) Desenha e testa os circuitos no logisim.

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| **Propriedade distributiva** |
| **A. (B + C)** | **≡** | **A . B + A . C** |
|  | **≡** |  |

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**Comprovação da regra de precedência das operações lógicas**

Quando numa mesma expressão Booleana aparecem operações E e OU, é necessário seguir a ordem de precedência. **A multiplicação (lógica) tem precedência sobre a adição (lógica).** Além disso, expressões **entre parêntesis têm precedência sobre operadores E e OU**.

a) Preenche a tabela de verdade

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| --- | --- | --- | --- | --- |
| **Precedência das operações** |  | Resposta A |  | Resposta B |
| 23=8 | Entradas |  |  |  |  |  |
| **A** | **B** | **A + B.C** |  |
| 0 | 0 | 0 |  |  |
| 1 | 0 | 1 |  |  |
| 2 | 1 | 0 |  |  |
| 3  | 1 | 1 |  |  |
| 4 | 0 | 0 |  |  |
| 5 | 0 | 1 |  |  |
| 6 | 1 | 0 |  |  |
| 7 | 1 | 1 |  |  |

 |  |

b) Testa os circuitos no logisim

b1) Qual dos circuitos esta correto?