**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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | | **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 |  |  | |  | |  |  |  |  |  | | --- | --- | --- | --- | --- | | **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 |  |  | |

b) Desenha e testa os circuitos no logisim.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **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 |  |  |  | |  | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **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 |  |  |  | |

b) Desenha e testa os circuitos no logisim.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **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

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

**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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | **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?