**Truth Table Problems**

**! = NOT && = AND || = OR (This is also order of precedence)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **A** | **B** | **A && B** |  | **A** | **B** | **A || B** |  | **A** | **!A** |
| T | T |  |  | T | T |  |  |  |  |
| T | F |  |  | T | F |  |  |  |  |
| F | T |  |  | F | T |  |  |  |  |
| F | F |  |  | F | F |  |  |  |  |

**DeMorgans Law**

!(A && B) = !A || ! B

!(A || B = !A && !B

Essentially if you NOT (!) an AND expression, it equates to NOTing both arguments and changing the AND to OR. The same is true with NOTing an OR expressions.

Problems

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **A** | **B** | **!A && B** |  | **A** | **B** | **!(A && B)** |  | **A** | **B** | **(A && B) && B** |
| T | T |  |  | T | T |  |  | T | T |  |
| T | F |  |  | T | F |  |  | T | F |  |
| F | T |  |  | F | T |  |  | F | T |  |
| F | F |  |  | F | F |  |  | F | F |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **A** | **B** | **A || !(B&&A)** |  | **A** | **B** | **(A &&(!B ))** |  | **A** | **B** | **!A || !B** |
| T | T |  |  | T | T |  |  | T | T |  |
| T | F |  |  | T | F |  |  | T | F |  |
| F | T |  |  | F | T |  |  | F | T |  |
| F | F |  |  | F | F |  |  | F | F |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **A** | **B** | **C** | **A &&!(B||C)** |  | **A** | **B** | **C** | **A ||(B && C)&&C** |  | **A** | **B** | **C** | **!(A || !C) &&(!B &&A)** |
| T | T | T |  |  | T | T | T |  |  | T | T | T |  |
| T | F | T |  |  | T | F | T |  |  | T | F | T |  |
| F | T | T |  |  | F | T | T |  |  | F | T | T |  |
| F | F | T |  |  | F | F | T |  |  | F | F | T |  |
| T | T | F |  |  | T | T | F |  |  | T | T | F |  |
| T | F | F |  |  | T | F | F |  |  | T | F | F |  |
| F | T | F |  |  | F | T | F |  |  | F | T | F |  |
| F | F | F |  |  | F | F | F |  |  | F | F | F |  |