calc_logic_example

Student Group

First Name	Surname	Matrikel Nr.

Table of Contents

example for a simplification with the rule for boolean algebra

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At first we will switch the representation to the following:

\begin{align*} \begin{array}{ll} \overline{a \lor (b \land (\bar{a} \lor c) \land 1) \lor a} & \color{white}{\overline{ab}} \\ \quad\quad\quad\quad\quad\quad & \quad\quad\quad\quad\quad\quad \\ \end{array} \end{align*}

At first we will switch the representation to the following:

\begin{align*} \begin{array}{ll} /(a + (b \cdot (/a + c) \cdot 1) + a) & \color{white}{\overline{ab}} \\ \quad\quad\quad\quad\quad\quad & \quad\quad\quad\quad\quad\quad \\ \end{array} \end{align*}

1. $\color{blue}{\text{Neutral Element}}$

\begin{align*} \begin{array}{ll} /(a + (b \cdot (/a + c) \color{blue}{\cdot 1}) + a) & \color{white}{\overline{ab}} \\ \quad\quad\quad\quad\quad\quad & \quad\quad\quad\quad\quad\quad \\ \end{array} \end{align*}

1. $\color{blue}{\text{Neutral Element}}$

\begin{align*} \begin{array}{ll} /(a + (b \cdot (/a + c) \quad \;) + a) & \color{white}{\overline{ab}} \\ \quad\quad\quad\quad\quad\quad & \quad\quad\quad\quad\quad\quad \\ \end{array} \end{align*}

2. $\color{blue}{\text{Commutative Law}}$

\begin{align*} \begin{array}{ll} /(a + \color{blue}{(b \cdot (/a + c) \quad \;) + a }) & \color{white}{\overline{ab}} \\ \quad\quad\quad\quad\quad\quad & \quad\quad\quad\quad\quad\quad \\ \end{array} \end{align*}

2. $\color{blue}{\text{Commutative Law}}$

\begin{align*} \begin{array}{ll} /(a + a + (b \cdot (/a + c) \quad \;)) & \color{white}{\overline{ab}} \\ \quad\quad\quad\quad\quad\quad & \quad\quad\quad\quad\quad\quad \\ \end{array} \end{align*}

3. $\color{blue}{\text{Idempotence}}$

\begin{align*} \begin{array}{ll} /(\color{blue}{a + a} + (b \cdot (/a + c)\quad \;)) & \color{white}{\overline{ab}} \\ \quad\quad\quad\quad\quad\quad & \quad\quad\quad\quad\quad\quad \\ \end{array} \end{align*}

3. $\color{blue}{\text{Idempotence}}$

\begin{align*} \begin{array}{ll} /(a \quad \enspace \: + (b \cdot (/a + c)\quad \;)) & \color{white}{\overline{ab}} \\ \quad\quad\quad\quad\quad\quad & \quad\quad\quad\quad\quad\quad \\ \end{array} \end{align*}

4. $\color{blue}{\text{Distributive Law}}$

\begin{align*} \begin{array}{ll} /(a \quad \enspace \: + (\color{blue}{b \cdot (/a + c)} \quad \;)) & \color{white}{\overline{ab}} \\ \quad\quad\quad\quad\quad\quad & \quad\quad\quad\quad\quad\quad \\ \end{array} \end{align*}

4. $\color{blue}{\text{Distributive Law}}$

\begin{align*} \begin{array}{ll} /(a \quad \, + ((b \cdot /a) + (b \cdot c))) & \color{white}{\overline{ab}} \\ \quad\quad\quad\quad\quad\quad & \quad\quad\quad\quad\quad\quad \\ \end{array} \end{align*}

5. $\color{blue}{\text{Associative Law}}$

\begin{align*} \begin{array}{ll} /(\color{blue}{a \quad \, + ((b \cdot /a) + (b \cdot c))}) & \color{white}{\overline{ab}} \\ \quad\quad\quad\quad\quad\quad & \quad\quad\quad\quad\quad\quad \\ \end{array} \end{align*}

5. $\color{blue}{\text{Associative Law}}$

\begin{align*} \begin{array}{ll} /(a \quad \, + \,\,(b \cdot /a) + (b \cdot c)\,\,) & \color{white}{\overline{ab}} \\ \quad\quad\quad\quad\quad\quad & \quad\quad\quad\quad\quad\quad \\ \end{array} \end{align*}

6. $\color{blue}{\text{Absorption Law}}$

\begin{align*} \begin{array}{ll} /(\color{blue}{a \quad \, + \,\,(b \cdot /a)} + (b \cdot c) \,\,) & \color{white}{\overline{ab}} \\ \quad\quad\quad\quad\quad\quad & \quad\quad\quad\quad\quad\quad \\ \end{array} \end{align*}

6. $\color{blue}{\text{Absorption Law}}$

\begin{align*} \begin{array}{ll} /(a \quad \, + \quad\enspace b \quad\,\, + (b \cdot c) \,\,) & \color{white}{\overline{ab}} \\ \quad\quad\quad\quad\quad\quad & \quad\quad\quad\quad\quad\quad \\ \end{array} \end{align*}

7. $\color{blue}{\text{Absorption Law}}$

\begin{align*} \begin{array}{ll} /(a \quad \, + \quad\enspace \color{blue}{b \quad\,\, + (b \cdot c)} \,\,) & \color{white}{\overline{ab}} \\ \quad\quad\quad\quad\quad\quad & \quad\quad\quad\quad\quad\quad \\ \end{array} \end{align*}

7. $\color{blue}{\text{Absorption Law}}$

\begin{align*} \begin{array}{ll} /(a \quad \, + \quad\enspace b) \qquad\qquad & \color{white}{\overline{ab}} \\ \quad\quad\quad\quad\quad\quad & \quad\quad\quad\quad\quad\quad \\ \end{array} \end{align*}