

calc_logic_example

Student Group

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example for a simplification with the rule for boolean algebra

```
\begin{align*} \begin{array}{ll} \overline{a \vee (b \wedge (\bar{a} \vee c) \wedge 1) \vee a} & \& \\ \quad \quad \quad \& \quad \quad \quad \& \\ \color{white}{\rule{10cm}{0.4pt}} & \& \\ \rule{4cm}{0.4pt} & \& \rule{4cm}{0.4pt} \\ \rule{4cm}{0.4pt} & \& \rule{4cm}{0.4pt} \\ \rule{4cm}{0.4pt} & \& \rule{4cm}{0.4pt} \\ \rule{4cm}{0.4pt} & \& \rule{4cm}{0.4pt} \\ \rule{4cm}{0.4pt} & \& \rule{4cm}{0.4pt} \end{array} \end{align*}
```

At first we will switch the representation to the following:

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

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

```
\begin{align*} \begin{array}{ll} (a + (b \cdot (\bar{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 (\bar{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*}
```

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

```
\begin{align*} \begin{array}{ll} (a + \color{blue}{(b \cdot (\bar{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*}
```

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

$$\begin{array}{l} (a + a + (b \cdot (a + c))) \& \overline{ab} \\ \quad \quad \quad \& \quad \quad \quad \end{array}$$

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

$$\begin{array}{l} (\color{blue}{a + a} + (b \cdot (a + c))) \& \overline{ab} \\ \quad \quad \quad \& \quad \quad \quad \end{array}$$

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

$$\begin{array}{l} (a \cdot (b \cdot (a + c))) \& \overline{ab} \\ \quad \quad \quad \& \quad \quad \quad \end{array}$$

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

$$\begin{array}{l} (a \cdot (\color{blue}{b \cdot (a + c)})) \& \overline{ab} \\ \quad \quad \quad \& \quad \quad \quad \end{array}$$

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

$$\begin{array}{l} (a \cdot ((b \cdot a) + (b \cdot c))) \& \overline{ab} \\ \quad \quad \quad \& \quad \quad \quad \end{array}$$

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