Propositional Logic

Definition: A proposition is a statement with a truth value: either true or false.

Propositional Operations

<table>
<thead>
<tr>
<th>$P$</th>
<th>$Q$</th>
<th>$\neg P$</th>
<th>$P \land Q$</th>
<th>$P \lor Q$</th>
<th>$P \oplus Q$</th>
<th>$P \implies Q$</th>
<th>$P \iff Q$</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
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</tbody>
</table>

We call this structure a truth table. The notation is interpreted as follows:

- $\neg$ means “not.”
- $\land$ means “and.”
- $\lor$ means “or.”
- $\oplus$ means “or, but not both of”, which we call “xor.”
- $\implies$ means “implies.”
- $\iff$ means “if and only if.”

In \LaTeX:

- $\neg$ is \verb|\lnot|.
- $\land$ is \verb|\land|.
- $\lor$ is \verb|\lor|.
- $\oplus$ is \verb|\oplus|.
- $\implies$ is \verb|\implies|.
- $\iff$ is \verb|\iff|. 