Deductions: using known true statements to create new true statements

If you graduate, you must pass a swimming test.

Premises:
1. If you graduate, you must pass a swimming test.
2. You graduated

\[ \begin{array}{c}
\text{Premises} \\
\{ \\
\text{If you graduate, you must pass a swimming test.} \\
\text{You graduated} \\
\} \\
\end{array} \]

\[ \begin{array}{c}
\text{Conclusion} \\
\{ \\
\text{You passed a swim test.} \\
\} \\
\end{array} \]

\[ P \rightarrow Q \]

\[ \begin{array}{c}
P \\
\hline
T \\
F \\
T \\
F \\
F \\
T \\
T \\
T \\
\end{array} \]

\[ \begin{array}{c}
P \\
\hline
T \\
T \\
F \\
F \\
T \\
T \\
T \\
T \\
\end{array} \]

If \( P \rightarrow Q \) is true and \( P \) is true, then \( Q \) must be true.

If premises are true, conclusion is true. If premises are false, conclusions don't hold.

This is like inductive Proof!

\[ P(K) \text{ is true } \rightarrow P(K+1) \text{ is true} \]
VS 
W \land P \rightarrow \neg T
T \rightarrow PVS
S \rightarrow P
T

\ldots
W = ?
P = ?
S = ?

\begin{tabular}{c|c|c|c|c|c|c|c|c|c|c}
W & P & S & T \\
\hline
T & T & T & F \\
T & T & F & T \\
T & F & T & F \\
T & F & F & T \\
F & T & T & T \\
F & F & T & F \\
F & F & F & F \\
\end{tabular}

In Words:

Because T and T \rightarrow PVS, must have PVS.
If \neg S, then must have.

P. But must have W because W VS is true.
But now W \land P, so we must have \neg T. But T is true, so we must have gone wrong. Only choice was \neg S, so instead, try S. Then since S \rightarrow P, we have P. Now we can't have W, otherwise \neg T. Thus S, P, \neg T. Tw, Black.