

Truth Tables

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Compound statements can be complicated and Truth Tables let you calculate with them.

An example

Professor says: If you get an A on the final, or you get at least 90 on the homework, then you pass this course.

This statement is TRUE provided that the Professor told the truth (didn't lie) – whether or not you get an A in the course.

Analysis

- ▶ You get an A in this course (P)
- ▶ You get an A on the final (Q)
- ▶ You get at least 90 on the homework (R)

The promise is:

If (Q or R) then P.

How many possibilities?

Truth Table

$$(Q \vee R) \implies P$$

Another example (see the text, Ch2.5)

Let P and Q be any statements. $(P \vee Q) \wedge \sim (P \wedge Q)$ reads as:
 $(P \text{ OR } Q)$ and NOT $(P \text{ AND } Q)$.

Example

$$P \iff (Q \vee R)$$

- ▶ $xy = 0$ if and only if $x = 0$ or $y = 0$.
- ▶ You will pass this course if and only if you get an A on the final or at least 90 on the homework.

Homework example

Write a truth table for $(P \wedge \sim P) \vee Q$.