

de Morgan's law

Propositional logic

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Exercise from yesterday

Give truth tables for the following expressions:

- 1 $\neg(s \wedge t)$
- 2 $\neg s \vee \neg t$

Compare the two.

What did you find?

Truth Values

s	t	$s \wedge t$	$\neg(s \wedge t)$	$\neg s$	$\neg t$	$\neg s \vee \neg t$
T	T	T	F	F	F	F
T	F	F	T	F	T	T
F	T	F	T	T	F	T
F	F	F	T	T	T	T

Definition

Definition (deMorgan's law)

$$\neg(s \wedge t) = \neg s \vee \neg t$$

Exclusive or

s	t	$s \oplus t$	$s \vee t$	$s \wedge t$	$\neg(s \wedge t)$	$(s \vee t) \wedge \neg(s \wedge t)$
T	T	F	T	T	F	F
T	F	T	T	F	T	T
F	T	T	T	F	T	T
F	F	F	F	F	T	F

Exercise

Consider the following statement:

Alice and Bob are not both ill.

- 1 Define predicate symbols and rewrite the statement in symbolic form.
- 2 Use deMorgan's law to rephrase the statement.
- 3 Rephrase the statement in English (or Norwegian), using the word 'well' rather than 'ill'.