

Section 1.3: DeMorgan's Law

DeMorgan's Law creates logically equivalent statements given an original statement.

Examples of DeMorgan's Law for symbolic logic:

Given statement: $(\sim P \wedge Q)$

DeMorgan's Law creates a logically equivalent statement:

$$\sim(\sim P \wedge Q) \equiv P \vee \sim Q$$

Given statement: $(\sim P \vee \sim Q)$ $\equiv \sim(\sim P \wedge \sim Q)$ $P \wedge Q$

• DeMorgan's Law creates a logically equivalent statement:

P	Q	$\sim P$	$\sim Q$	$P \wedge Q$	$\sim P \vee \sim Q$
T	T	F	F	T	F
T	F	F	T	F	T
F	T	T	F	F	T
F	F	T	T	F	T

$\sim(\sim P \wedge \sim Q)$
T
F
F
F

Examples of DeMorgan's Law for compound sentences.

Given: Today is Monday and you do not have history.

$$\sim(P \wedge \sim Q) \equiv \sim P \vee Q$$

Logically Equivalent statement:

TODAY IS NOT MONDAY OR YOU DO HAVE HISTORY.

Given: You were not in class or you did not send an email.

Logically Equivalent statement:

YOU WERE IN CLASS AND YOU DID SEND AN EMAIL.