

6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

Mathematics for Computer Science
6.042J/18.062J

IMPLIES



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February 15, 2017

IMPLIES.1

6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

IMPLIES

The value of (P IMPLIES Q) is F iff
P is T and Q is F.

Truth Table for IMPLIES

P	Q	P IMPLIES Q
T	T	T
T	F	F
F	T	T
F	F	T



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IMPLIES.2

6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

IMPLIES

The value of (P IMPLIES Q) is F iff
P is T and Q is F. So

P IMPLIES Q
same as
 \bar{P} OR Q



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IMPLIES.3

6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

IMPLIES

The value of (P IMPLIES Q) is F iff
P is T and Q is F.

Truth Table for IMPLIES

P	Q	P IMPLIES Q
T	T	T
T	F	F
F	T	T
F	F	T



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IMPLIES.4

6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

A True Implication

$(1=-1)$ IMPLIES (I am Pope)
 We reasoned *correctly* to reach the false conclusion



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IMPLIES.5

6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

A True Implication

$(1=-1)$ IMPLIES (I am Pope)
 We reasoned *correctly* to reach the false conclusion



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IMPLIES.6

6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

A True Implication

$(1=-1)$ IMPLIES (I am Pope)
 We reasoned *correctly* to reach the false conclusion from the false hypothesis.



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IMPLIES.7

6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

A True Implication

$(1=-1)$ IMPLIES (I am Pope)
 We reasoned *correctly* to reach the false conclusion from the false hypothesis.



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IMPLIES.8

6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

A True Implication

$(1=-1)$ IMPLIES (I am Pope)
 The whole **implication is true**,
 even though both conclusion
 & hypothesis are **false**.



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IMPLIES.9

6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

False implies False?

Having P IMPLIES Q be **T**
 when P and Q are both **F**
 clashes with the idea that
 "implies" indicates that P
 somehow **causes** Q .



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IMPLIES.10

6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

Causal Implication?

"If he had slept more, he
 would have gotten an A."



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IMPLIES.11

6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

Causal Implication?

"(slept more) IMPLIES A"
 You might claim this was
false



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IMPLIES.12

6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

Causal Implication?

"(slept more) **IMPLIES** A"
 You might claim this was **false** because the sleepy student with the poor grade also had not studied...



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IMPLIES..13

6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

Causal Implication?

"(slept more) **IMPLIES** A"
 You might claim this was **false** because ...lack of sleep was not a **cause** of the poor grade.



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IMPLIES..14

6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

IMPLIES is not causal

Causal/counter-factual assertions make some sense, although they raise philosophical problems.
 The propositional connective **IMPLIES** ignores causality.



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IMPLIES..15

6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

IMPLIES is not causal

Causal/counter-factual assertions make some sense, although they raise philosophical problems.
 The propositional connective **IMPLIES** ignores causality. This makes it simple, but still useful.



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IMPLIES..16