

VALID OR INVALID

Section 7.3

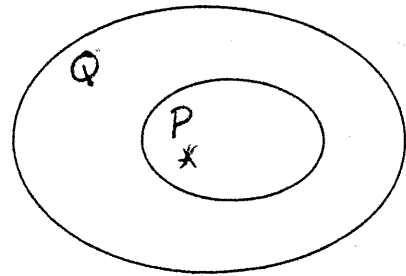
Valid arguments:

** Direct argument:

Conditional

REMINDER

P	q	P → q
T	T	T
T	F	F
F	T	T
F	F	T



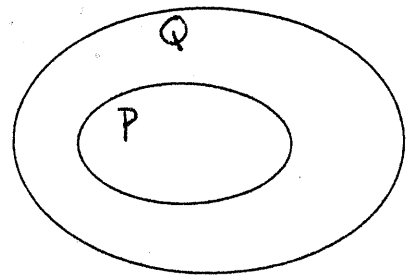
Premise 1: $p \rightarrow q$
 Premise 2: p
 Therefore $\therefore q$

(if p, then q) T
 (p is true) T
 (therefore q is true)

** Indirect Argument:

REMINDER *

P	q	P → q
T	T	T
T	F	F
F	T	T
F	F	T



Premise 1: $p \rightarrow q$ T
 Premise 2: $\sim q$
 Therefore $\therefore \sim p$

(if p, then q) T
 (q is not true) F
 (therefore p is not true)

Contrapositive

INVALID ARGUMENTS

** Converse Error

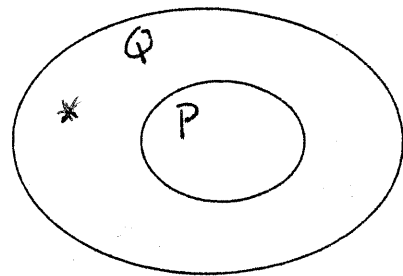
Premise 1: $p \rightarrow q$
 Premise 2: q
 Therefore $\therefore p$

INVALID!

(if p, then q) T
 (q is true) T
 (therefore p is true)

REMINDER

P	q	P → q
T	T	T
T	F	F
F	T	T
F	F	T



** Inverse Error

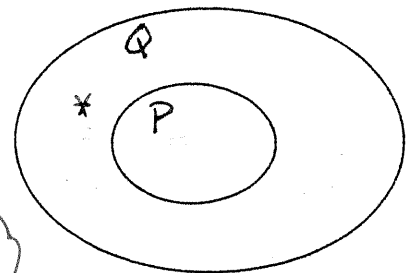
Premise 1: $p \rightarrow q$
 Premise 2: $\sim p$
 Therefore $\therefore \sim q$

INVALID!

(if p, then q)
 (p is not true)
 (therefore q is not true)

REMINDER

P	q	P → q
T	T	T
T	F	F
F	T	T
F	F	T



VALID OR INVALID - WHY?

P	q	$p \rightarrow q$
T	T	T
T	F	F
F	T	T
F	F	T

Converse > invalid
 Inverse > invalid
 Conditional > valid
 Contrapositive > valid

$$\frac{a \rightarrow b \quad \sim b}{\therefore \sim a}$$

valid - indirect arg.
Contrapositive

$$\frac{c \text{ or } d \quad \sim c}{\therefore d}$$

valid - or rule

$$\frac{s \rightarrow t \quad \sim s}{\therefore \sim t}$$

invalid - Inverse error

not a valid method of proving TRUE

$$\frac{f \text{ or } g \quad f}{\therefore \sim g}$$

invalid - or rule

g could be TRUE!

$$\frac{c \rightarrow d \quad c}{\therefore d}$$

valid - direct arg
 Law of Detachment

$$\frac{c \rightarrow d \quad d \rightarrow e}{\therefore c \rightarrow e}$$

valid - chain rule

chain rule

$$\frac{s \rightarrow t \quad t}{\therefore s}$$

invalid - converse error

$$\frac{f \rightarrow g \quad f \rightarrow h}{\therefore g \rightarrow h}$$

invalid

Chain error

$$\frac{a \text{ or } b \quad \sim a}{\therefore \sim b}$$

invalid - or rule

(one must be T)

b must be TRUE!

Decide if each argument is valid or invalid. WHY?

1. Premise 1: If a figure is a parallelogram, then it is a quadrilateral. ^P ^q
 Premise 2: ABCD is a quadrilateral. ^q
 Conclusion: ABCD is a parallelogram. ^p $q \rightarrow p?$

Invalid
 converse error!

2. Premise 1: If you study, you will pass the test. ^P ^q
 Premise 2: You did not pass the test. ^{~q}
 Conclusion: You did not study. ^{~p}

Valid
 indirect (Law of contrapositive inference)

3. Premise 1: If a figure is a square, then it is a polygon. ^P ^q
 Premise 2: Figure DFG is not a square. ^{~p}
 Conclusion: Figure DFG is not a polygon. ^{~q} $\sim p \rightarrow \sim q?$

Invalid
 inverse error!

4. Premise 1: If a person is a member of the travel club, then the person likes to travel. ^P ^q
 Premise 2: Dave is not a member of the travel club. ^{~p}
 Conclusion: Dave does not like to travel. ^{~q}

Invalid
 inverse error!

5. Premise 1: All multiples of 20 are multiples of 5. ^P
 Premise 2: Sam's locker number is a multiple of 5. ^q
 Conclusion: Sam's locker is a multiple of 20. ^p $\text{If } a \# \text{ is a mult. of } 20, \text{ then it is a mult. of } 5.$

Invalid
 converse error!

6. Premise 1: Every member of the swim team, likes to swim. ^P
 Premise 2: Jason is not a member of the swim team. ^{~p}
 Conclusion: Jason does not like to swim. ^{~q} $\text{If you are a member of the swim team, then you like to swim.}$

Invalid
 inverse error!

7. Premise 1: If we visit Hong Kong, then we will eat well. ^P ^q
 Premise 2: If we visit Hong Kong, then we will see Victoria Harbor. ^r
 Conclusion: If we eat well, then we will visit Victoria Harbor.

Invalid
 chain rule!

8. Premise 1: Brian is in his room ^P listening to music. ^q
 Premise 2: Brian is in his room. ^p
 Conclusion: Brian is not listening to music.

Invalid
 OR rule!

