Inductive Reasoning

Reasoning from the specific to the general.

Deductive Reasoning

Reasoning from the general to the specific.

If a given statement is true, deductive reasoning produces a true conclusion.

Law of Detachment

If $p \rightarrow q$ is a true statement and p is true, then q is true.

Given a ***general conditional*** that is true,

…and a ***specific situation***

…if the conditional's ***hypothesis*** applies to the specific situation

…then its conclusion holds true for the situation too

Example – Pg 83, Check Understanding #2

LOD
1 Gen condit
1 spec situat

Given:

cond If a baseball pitcher is a pitcher,
then that player should not pitch a complete game two days in a row.

S.S Vladimir Nuňez is a pitcher.
On Monday, he pitches a complete game.

Does the specific situation relate directly to the conditional's hypothesis?

Yes ∴ can use Law of Detachment

Conclusion:

Vladimir should not pitch a complete game on Tuesday

Example – Pg 83, Check Understanding #3

Given:

cond If a road is icy, then driving conditions are hazardous

∴ ~~Driving conditions are hazardous~~ I-5 is covered w/ice

Does the specific situation relate directly to the conditional's hypothesis?

No – situation relates to the ***conclusion*** not the hypothesis.

Can not use Law of Detachment

The Law of Detachment review

Applies if you have 1 conditional and 1 statement:

1) true general conditional

2) specific situation/statement

3) specific situation directly relates to hypothesis of conditional

$x = y,\ y = z,\ z = b,\ b = 3$

$x = 3$

cond

$p \to q,\ q \to r,\ r \to s,\ s \to t$

$p \to t$

$x = y,\ y = 3$

$x = 3$

cond

hyp

CHAIN

$p \to q$, $q \to r$, $r \to s$, $s \to t$

$p \to t$

The Law of Syllogism

If $p \to q$ and $q \to r$ are true statements, then $p \to r$ is true

If you have a chain of conditionals…

…the conclusion of one…

…is the hypothesis of the next…

Then you can say the final conclusion follows directly from the initial hypothesis...

...can skip all the middle stuff & jump straight to final conclusion!

Kind of like the *Transitive Law of Logic* (***not*** formally called this...)

Example – Pg 83, Check Understanding #4 part a

LoS

If a number ends in 0, then it is divisible by 10. (p, q)

LoL

If a number is divisible by 10, then it is divisible by 5. (q, r)

Clear & consistent chain? Y

$p \to r$

Both statements are true? Y

Therefore we can conclude *p* → *r*.

ROFLOL

Conclusion:

If a number ends in 0, then it is divisible by 5.

Example – Pg 83, Check Understanding #4 part b

LoS?

If a number ends in 6, then it is divisible by 2.

N

If a number ends in 4, then it is divisible by 2.

Clear & consistent chain? N

Conclusion of one is not the hypothesis of the next.

Not possible to apply the Law of Syllogism.

The Law of Syllogism review

Applies if you have $\geq$ 2 conditionals:

1) form a connected chain

2) conclusion of each one matches hypothesis of next

Law of Detachment	*Law of Syllogism*
• 1 conditional • 1 statement • statement $\Rightarrow$ hypothesis	• $\geq$ 2 conditionals • connected chain... • conclusion$\Rightarrow$hypothesis, conclusion$\Rightarrow$hypothesis, conclusion$\Rightarrow$hypothesis, ...

p 84 #1-15, 23-31 odd, 38-44

p 88 # 1-10

Example – Pg 86, #22 LOD

<u>Statement</u>
All national parks
are interesting.

<u>Conditional</u>
If a park is a national park, T
then it is interesting.

<u>Statement 2</u>:
Mammoth Cave is a national park.

Which law appears to apply here...Detachment or Syllogism?

Does statement 2 directly related to the hypothesis of the conditional?

Yes, can use Law of Detach…conclusion:

Mammoth Cave is interesting.

Example – Pg 86, #22

<u>Statement 1</u>:
All national parks are interesting.

<u>Conditional</u>:
If a park is a national park, it is interesting.

<u>Statement 2</u>:
Mammoth Cave is a national park.

Statement 2 directly related to the hypothesis

Can use Law of Detach…

Mammoth Cave is interesting.

What about this?

~~[illegible]~~ or LOS?

If a number is divisible by 10, then it is divisible by 5.

If a number ends in 0, then it is divisible by 10.

What about this?

LOS

If a number ends in 0, then it is divisible by 10.

p q

If a number is divisible by 10, then it is divisible by 5.

q r

Which law appears to apply here...Detachment or Syllogism?

Clear & consistent chain? y

Both statements are true? y

Therefore we can conclude $p \rightarrow r$.

If a number ends in 0, then it is divisible by 5 if reorder the statements.

p r

...and how about this? of LOS?

If a number ends in 0, then it is divisible by 10. T

If a number is divisible by 10, then it is divisible by 5. T

If a number is divisible by 5, then it is divisible by 2. F

Which law appears to apply here...Detachment or Syllogism?

Clear & consistent chain?

All statements are true?

Chain is broken by a false conditional statement...