3.5 Symbolic Arguments

Math 120

Math for General Education

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Symbolic Arguments

- A **symbolic argument** consists of a set of ***premises*** and a ***conclusion.***
  - *Called symbolic argument because we generally write it in symbolic form to determine its validity.
- An **argument is valid** when its conclusion necessarily follows from a given set of premises.
- An **argument is invalid** or a **fallacy** when the conclusion does not necessarily follow from the given set of premises.
- There is a **procedure** to follow to determine the validity of an argument…

Symbolic Arguments (cont.)

Procedure to Determine Whether an Argument is Valid (pg 153)

1. Write the argument in symbolic form.
2. Compare the form of the argument with forms that are known to be valid or invalid. (if unknown skip to 3)
3. If the argument contains 2 premises, write a conditional statement of the form:
   [(premise 1) Λ (premise 2)] → conclusion
4. Construct a truth table for the above statement
5. If the answer column in the truth table contains ALL T's (tautology), the argument is valid. Anything else is invalid.

Symbolic Arguments (cont.)

EX: If the cat is in the room, then the mice are hiding. The cat is in the room. Therefore the mice are hiding.

Let

p: The cat is in the room.

q: The mice are hiding.

Symbolically:

Premise 1: $p \rightarrow q$

Premise 2: p

Conclusion: $\therefore q$ (three dot triangle is read "therefore")

[(premise 1) Λ (premise 2)] → conclusion

$[(p \rightarrow q) \wedge p] \rightarrow q$

Construct the truth table:

Symbolic Arguments (cont.)

#		1	3	2	5	4
p	q	[(p→q)	∧	p]	→	q
T	T	T	T	T	T	T
T	F	F	F	T	T	F
F	T	T	F	F	T	T
F	F	T	F	F	T	F

*Once we have demonstrated that an argument in a particular form is valid, all arguments with exactly the same form will also be valid.

*In fact they are assigned names. This one is called law of detachment or modus ponens.

p→q
p
∴q

Standard Forms of Arguments

Valid Arguments	Law of Detachment (Modus Ponens)	Law of Contra-position (Modus Tollens)	Law of Syllogism	Disjunctive Syllogism
	p→q p ∴q	p→q ~q ∴~p	p→q q→r ∴p→r	p V q ~p ∴q
Invalid Arguments (Fallacies)	**Fallacy of the Converse**	**Fallacy of the Inverse**		
	p→q q ∴p	p→q ~p ∴~q		

Example

- Translate into symbols and determine if it is valid or invalid by using the standard arguments or truth tables.
- If Bonnie passes the bar exam, then she will practice law. Bonnie will not practice law. Therefore she did not pass the bar exam.

p: Bonnie passes the bar exam.
q: Bonnie will practice law.

$p \rightarrow q$
$\sim q$
$\therefore \sim p$

Valid argument by: Law of Contraposition or (Modus Tollens)

Practice Problems

- In Class
  - Pages 159 – 161
  - #24, 43, 58
- Homework
  - Pages 159 – 161
  - #15 – 63 (Multi of 3)