Philosophy 101

(2/17/11)

- **Quiz #1 to be returned today** (end of class)

- **I *will* be grading on a "curve" after all.** [I'll say more about the curve after the next homework is returned.]

- **Solutions to Quiz #1 posted** (except #4, which is on HW 2 — this was my mistake, caused by problem # changes from 1st edition)

- **HW #2 due *Today*. HW #3 assigned today** (see web)

- **Today: Chapter 3, Continued**
  - **Validity: sentential and predicate-logical**
    - **Two subtle aspects of *formal validity***
    - **Next: *cogency* (of invalid arguments)**

- **Validity — Sentential Logic (connectives)**

- In *sentential* (or *propositional*) logic, we use capital letters to denote *atomic sentences*, and we have 5 *sentential connectives*:

Sentential Connectives

Conjunction	*A* and *B*
Disjunction	*A* or *B*
Negation	~*A*
Conditional	If *A* then *B*
Biconditional	*A* if and only if *B* (If *A* then *B*, and if *B* then *A*)

- **Validity — Sentential Logic (sentential form)**

- Determining the *sentential form* of a statement (or an argument) involves the following *three steps*:

1. *Identify* the "atomic" sentences. These are sentences that contain *no sentential connectives* (that is – statements containing no conjunctions, disjunctions, negations, or conditionals).
   - Note: this may involve "simplification" if (for instance) one of the sentences in the passage is intended to be the *negation* of another (as in the example on the next slide).

2. *Assign* capital letters (labels) to each "atomic" sentence.

3. *Substitute* the capital letters (labels) of each "atomic" sentence, for their English sentence counterparts.

- **Validity — Sentential Logic (sentential form)**

Example 3.4

Biz E. wants to make a phone a call, so he picks up the phone but he hears that someone else is already making a call from one of the other phones on the same line. He quickly hangs up, without identifying the voice he heard. He then wonders who is using the phone. He knows that it must be either his wife or his son, since there is no one else at home. He then looks out the window and sees that his son is out in the backyard mowing the lawn, so he concludes that his wife is the one on the phone.

- There are actually only *two* atomic sentences in this argument.
  - (*Q*) B.E.'s wife is on the phone.
  - (*P*) B.E.'s son is on the phone.
- You *may think* there is a *third* atomic sentence in this argument:
  - (*R*) B.E.'s son is in the backyard.
- But, *R* is just meant to convey the *negation* of *P*, which is *not* "atomic" because it contains the negation sign ("~").
- So, the second premise of this argument is ~*P* (rather than "*R*").

• Validity — Sentential Logic (some valid forms)

- Some sentential forms are *valid*, and others are *in*valid.
- Let's discuss some *valid* forms first…

A. Argument by elimination

1. Either *P* or *Q*.
2. ~*P*.

3. *Q*.

1. Either the American League will win or the National League will win.
2. The American League won't win.

3. The National League will win.

B. Simplification

1. *P* and *Q*.

2. *P*.

1. Sarah knows logic and Sam does not know logic.

2. Sarah knows logic.

C. Affirming the antecedent (*Modus ponens*)

1. If *P* then *Q*.
2. *P*.

3. *Q*.

1. If the president is in the White House, then the president is in Washington, D.C.
2. The president is in the White House.

3. The president is in Washington, D.C.

• Validity — Sentential Logic (more valid forms)

D. Denying the consequent (*Modus tollens*)

1. If *P* then *Q*.
2. ~*Q*.

3. ~*P*.

1. If the president is in the White House, then the president is in Washington, D.C.
2. The president is not in Washington, D.C.

3. The president is not in the White House.

E. Hypothetical syllogism

1. If *P* then *Q*.
2. If *Q* then *R*.

3. If *P* then *R*.

1. If Jones passes the test, then Jones passes the course.
2. If Jones passes the course, then Jones graduates.

3. If Jones passes the test, then Jones graduates

F. Contraposition

1. If *P* then *Q*.

2. If ~*Q* then ~*P*.

1. If the president is in the White House, then the president is in Washington, D.C.

2. If the president is not in Washington, D.C., then the president is not in the White House.

• Validity — Sentential Logic (two *in*valid forms)

A. Denying the antecedent

1. If *P* then *Q*.
2. ~*P*.

3. ~*Q*.

1. If the president is in the White House, then the President is in Washington, D.C.
2. The president is not in the White House.

3. The president is not in Washington, D.C.

B. Affirming the consequent

1. If *P* then *Q*.
2. *Q*.

3. *P*.

1. If the president is in the White House, then the president is in Washington, D.C.
2. The president is in Washington, D.C.

3. The president is in the White House.

• Validity — Predicate Logic (basics)

• In predicate logic, capital letters are used to denote *predicates*, and lower case letters are used to denote *objects*.

• There are two main kinds of claims in predicate logic:

• **Singular** claims are about *particular* objects.
  • *E.g.*, Socrates is a man.

• **General** claims (or **generalizations**) are about a group (or a population) of objects.
  • *E.g.*, All men are mortal.

  • We will encounter three types of generalizations, involving the three quantifiers "All", "Some", and "Most".

• Validity — Predicate Logic (some valid forms)

1. All *A*s are *B*s.	1. All men are mortal.
2. *x* is an *A*.	2. Socrates is a man.
3. *x* is a *B*.	3. Socrates is mortal.
1. All *A*s are *B*s.	1. All desserts are sweet.
2. *x* is not a *B*.	2. This lima bean is not sweet.
3. *x* is not an *A*.	3. This lima bean is not a dessert.
1. All *A*s are *B*s.	1. All fork-tailed flycatchers are birds.
2. All *B*s are *C*s.	2. All birds have wings.
3. All *A*s are *C*s.	3. All fork-tailed flycatchers have wings.
1. No *A*s are *B*s.	1. No men are mothers.
2. *x* is an *A*.	2. Tom Cruise is a man.
3. *x* is not a *B*.	3. Tom Cruise is not a mother.

• Validity — Predicate Logic (some *in*valid forms)

1. All *A*s are *B*s.	1. All men are mortal.
2. *x* is not an *A*.	2. Fido is not a man.
3. *x* is not a *B*.	3. Fido is not mortal.
1. All *A*s are *B*s.	1. All men are mortal.
2. *x* is a *B*.	2. Fido is mortal.
3. *x* is an *A*.	3. Fido is a man.

Another important Example:

*Most A*s are *B*s.
x is an *A*.
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x is a *B*.