PHIL 2310: INTRODUCTION TO DEDUCTIVE LOGIC

Wednesday, 25 August
Joel Velasco

AGENDA

- Introductions

- Course Information

- What is logic?

COURSE INFORMATION

- **Joel Velasco**
  joelvelasco@cornell.edu
  Office: Goldwin Smith 228
  2-3pm Tue, 2:30-3:30 W,
  or email for appointments

- **Course Requirements**
  30% Homework
  20% x 2 for prelims
  30% Final

- **Language, Proof and Logic**
  Barwise and Etchemendy

- **Software**
  Tarski's World, Fitch and Boole

HOMEWORK

- **Assignments**
posted online one week before due date: Everything is posted at: http://courses.cit.cornell.edu/jdv55/teaching/2310/

- **Submission**
online: Grade Grinder
written: bring to class
typically due Monday
No Late Work

- **Collaboration**

- discuss anything you want
  - we encourage working in groups!

- complete/submit your work without consulting others or group work

GRADE GRINDER

WHAT IS LOGIC?

- logic as good reasoning

  - In this view, logic is about the difference between valid and invalid arguments

- In a valid argument, the conclusion *follows* from the premises. *IF* all of the premises are true, then the conclusion is (must be, would be...) true.

  - Equivalently: It is impossible for all of the premises to be true and the conclusion false.

VALIDITY AND ARGUMENTS

(1) If our currency loses value then our trade deficit will narrow.

(2) Our currency will lose value.

Conclusion: Our trade deficit will narrow

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VALIDITY AND ARGUMENTS

(1) If our currency loses value then our trade deficit will narrow.

$P \rightarrow Q$

(2) Our currency will lose value.

P

Conclusion: Our trade deficit will narrow

Q

VALID

VALIDITY AND ARGUMENTS

(1) If our currency loses value then our trade deficit will narrow.

$P \rightarrow Q$

(2) Our trade deficit will narrow

Q

Conclusion: Our currency will lose value.

P

INVALID

VALIDITY AND ARGUMENTS

(1) If the continuum hypothesis is true then the set theoretic universe is constructible

(2) The continuum hypothesis is true

Conclusion: The set theoretic universe is constructible

$$P \rightarrow Q$$

$$P$$

$$\overline{}$$

$$Q$$

VALID

VALIDITY

- From these examples we can see that validity as a property of arguments is:

  (1) topic neutral

  (2) independent of actual truth and falsity

  We didn't need to know any economics or any facts about the world to judge the validity of the previous two arguments.

WHAT IS LOGIC?

- logic as good reasoning versus logic as a system

- First-Order Logic (FOL)

- computers and programming languages

- differences between FOL and natural language; the role of formal logic

- logical consequence and methods of proof

THIS COURSE

- Learn two systems of FOL: propositional logic and predicate logic

- Convert natural language arguments into FOL

- Create and assess proofs in FOL

- <u>Keep in mind</u>
  advantages of FOL; possible limitations of FOL; relationship between FOL and natural language

Recognizing versus Diagnosing Bad Reasoning