# Introduction to Logic PHIL 170

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#### Announcements

- ▶ Problem sets due today. Deadline extended until 11.59pm.
- Quiz and a Lab due Sunday, 11.59pm.
- ► See the announcement and video about Chained Arguments.
- By the end of the week, Chapters 1 & 2 should be completed. Starting reading Chapter 3 for Monday and Wednesday. Answer the "Did I Get It?" questions.
- You may need to reset a problem...

#### Recap

- Statements can be either true or false (but not both).
- An argument is a set of statements, one of which is singled out as the conclusion, the other statements are called premises.
- An argument is valid if it is impossible that the premises are all true and the conclusions is false.
- An argument is **sound** if it is valid and all the premises are true.
- Identifying argument patterns: Joint and independent support, chained arguments, structured premises/conclusions.

## An argument is...

**valid**: it is impossible for all the premises to be true and the conclusion to the false.

**sound**: the argument is valid and all the premises are true.

**inductively strong**: the truth of the premises make the conclusion more probable.

cogent: the argument is inductively strong and the premises are true

#### Did I Get This?: Identifying Good Arguments

It is currently raining outside and it is not currently raining outside. I will get an A in PHIL 170

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It is raining outside.

Either I will get an A in PHIL 170 or I will not get an A in PHIL 170.

# Argument Diagramming

- What are the premises and conclusion?
- Do the premises support the conclusion? Is it joint or independent support?

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  - Are the statements structured or unstructured?
  - Is it a chained argument?
    - How should the argument be "filled-in?
    - What type of inference pattern(s) is(are) being used?

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Eric lived in Amsterdam.

You will get an A in PHIL 170.



#### Eric Pacuit

# Valid: Modus Ponens



# Not Valid



# Not Valid: Affirming the Consequent



# Inference Patterns, I

- Modus Ponens
- Modus Tollens
- Disjunctive Syllogism (left), Disjunctive Syllogism (right)
- Simplification (left), Simplification (right)
- Addition (left), Addition (right)

# Inference Patterns, II

- Denying the Antecedant
- Affirming the Consequent
- Affirming a (Left) Disjunct, Affirming a (Right) Disjunct
- Denying a (Left) Conjunct, Denying a (Right) Conjunct

# Valid inference patterns

#### **Modus Ponens**



### Modus Tollens



# Disjunctive Syllogism (left)







# Simplification (left)



# Simplification (right)



# Addition (right)



# Addition (left)



#### Invalid inference patterns

# Denying the Antecedent



# Affirming the Consequent















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Was C a knight or a knave?

# The Argument

A knave wouldn't say "I'm a knave" because knaves always lie. A knight wouldn't say "I'm a knave" because knights always tell the truth. So, no one would say "I'm a knave". Therefore, B is lying. Thus, C is telling the truth. Hence, C is a knight.



Suppose that Abercrombie didn't ask A whether he was a knight or a knave (because he would have known in advance what answer he would get), but instead asked A how many of the three were knaves. Again A answered indistinctly, so Abercrombie asked B what A had said. B then said that A had said that exactly two of them were knaves. Then, as before, C claimed that B was lying.

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Is it now possible to determine whether C is a knight or a knave?