**PH126 Logic I** · Lecture 7
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*Proof example with →*

1. P→Q
2. ¬Q
6. ¬P

**How to determine the truth of sentences involving ∀**

1. Give every object a name.

2. For each name in turn, create a new sentence like this: delete the quantifier and replace all instances of the variable it binds with that name

3. If ALL of the new sentences are true, so is the original.

**Quantifiers**

Everything is broken: ∀x Broken(x)

Something is broken: ∃x Broken(x)

What does ∃ mean? We give the meaning of ∃ by specifying what it takes for a sentence containing ∃ to be true:

1. Give every object a name.

2. For each name in turn, create a new sentence like this: delete the quantifier and replace all instances of the variable it binds with that name

3. If ANY OF the new sentences are true, so is the original.

∀Elim
- ∀x S(x)
- …
- S(c)

∃Intro
- S(a)
- …
- ∃x S(x)

**First quantifier rule of proof: ∀Elim**

∀Elim
- ∀x S(x)
- …
- S(c)

**Proof example: ∀Elim, ∃Intro**

1. ∀x ( Puf(x) → YelBk(x) )
2. Puf(a)
3. Puf(a) → YelBk(a) ∀Elim:1
4. YelBk(a) →Elim: 3,2
5. ∃x YelBk(x) ∃Intro: 4

**Exercises 04**

*For your fifth seminar*

*Not for fast groups*

*(Bit more than usual this week because reading week gives you two weeks to complete these)*

3.14–15 (counterexamples)
6.8 (proof)
6.24–7 (proof)
7.1–2, *7.3–6 (truthtables)
8.1 (conditionals; yes/no answers are ok)
8.17–19, *8.20–23
9.1 odd nos only (quantifiers)
9.2 even nos only (quantifiers)
9.4–5, 9.8–10, 9.12 (quantifiers)