MACM 101 Lecture 1.2 - Friday September 13

Alexander Ng

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1 Summary

Valid arguments
- inference rules for propositional logic
- using rules of inference to build arguments
- rules of inference for quantified statements
- building arguments for quantified statements

1.1 Goals

Provide a foundation for proof theory - a purely deductive, valid argument

2 ???

How can one prove that "Toilet paper should be installed over as opposed to under"

3 What is an Argument

We are talking about a proof in a formal axiomatic system where there is no ambiguity or probability (no application in the real world) :skull:.

We are only concerned with deductive arguments

3.1 Truth vs Validity

Truth is predicated on propositions, which are either true or false

Validity is predicated on **deductive arguments**, which are either valid or invalid

3.2 Definition

A deductive argument is a sequence of declarative statements.

A valid deductive argument is an argument such that no matter what particular statement are substitude for the statement

3.2.1 Formal Definition of a Valid Argument

a deductive argument is valid if and only if the premises provide conclusive proof of the conclusion

Either of the following must hold:

if the premises of a vlalid argument are all true, then its conclusion must also be true

it is impossible for the conclusion of a valid argument to be false while its premises are true

In other words, a tautology is a necessary and sufficient condition for a valid argument