cse371/mat371
LOGIC

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CHAPTER 1 REVIEW
SOME DEFINITIONS and FACTS

DEFINITIONS and FACTS

Definition

Logical Paradoxes, also called Logical Antinomies are paradoxes concerning the notion of a set

FACT

Russell Paradox

Consider the set A of all those sets X such that X is not a member of X

Clearly, A is a member of A if and only if A is not a member of A

So, if A is a member of A, the A is also not a member of A; and if A is not a member of A, then A is a member of A

In any case, A is a member of A and A is not a member of A.

CONTRADICTION!

DEFINITIONS and FACTS

FACT

The MAIN difference between **classical** and **intuitionists' mathematics** lies in the interpretation of the word **exists**

In classical mathematics proving **existence** of an object x such that $P(x)$ holds **does not mean** that one is able to indicate a method of **construction** of it

In the **intuitionists' universe** we are justified in asserting the **existence** of an object having a certain property only if we know an **effective method** for constructing, or finding such an object

DEFINITIONS and FACTS

Definition

Semantic Paradoxes are paradoxes that deal with the notion of truth

FACT

The Liar Paradox:

A man says: I am lying.

If he is lying , then what he says is true, and so he is not lying

If he is not lying, then what he says is not true,

and so he is lying

CONTRADICTION!

DEFINITIONS and FACTS

Definition

A **non-monotonic inference** is a reasoning in which introduction of a new information can **invalidate** old facts

Example

Consider a statement Birds fly. Tweety, we are told, is a bird.

From this, and the fact that birds fly, we conclude that Tweety can fly

This conclusion is **defeasible:** Tweety may be an ostrich, a penguin, a bird with a broken wing, or a bird whose feet have been set in concrete.

This is a **non-monotonic Inference:**
on learning a new fact (that Tweety has a broken wing), we are forced to **retract** our conclusion (that he could fly)

DEFINITIONS and FACTS

Definition:

A **default** reasoning is a reasoning that let us draw of plausible inferences from less-than- conclusive evidence in the absence of information to the contrary

Observe: non-monotonic reasoning is an example of the default reasoning

Definition

Any reasoning about one's own knowledge or **belief** is called an **auto-epistemic** reasoning

Auto-epistemic reasoning **models** the reasoning of an ideally rational agent reflecting upon his beliefs or knowledge