

Problems: p289, #1.

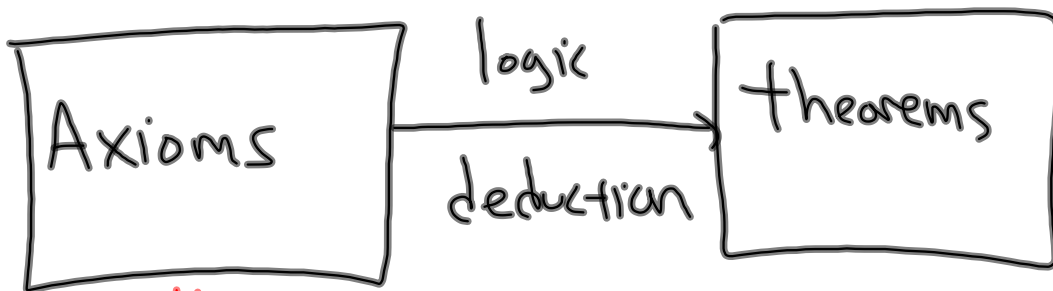
Geometry

* Why study Euclidean geometry?

- Profoundly Influential on scientific thought.
- Excellent to begin learning reasoning.
- Beautiful "toy example"

Why is proof important?

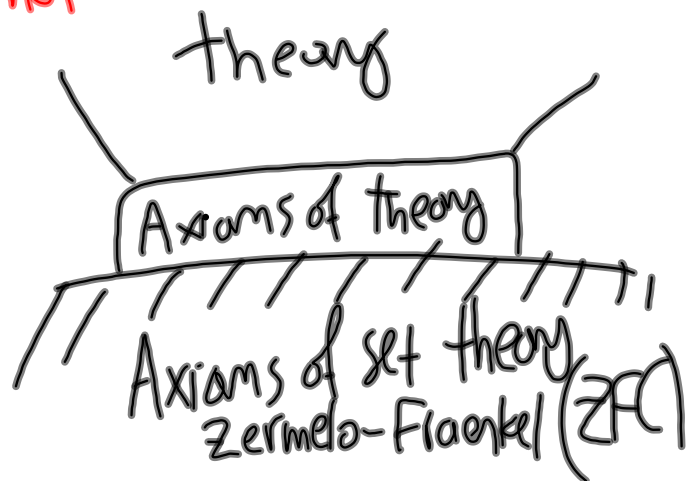
- ~~(Memorization)~~ Understanding.
- Helps us understand why things are true.
- Allows us to be certain about things we can't experience, observe, etc.
- Differentiate b/w false things & true things.



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statements we accept as true, which can not themselves be proved.

More precisely



Q: What choices do we have wrt. our fundamental axioms?

Def: A set of axioms is complete if any statement is provably true or false.

Def: A set of axioms is consistent if no statement is provably true and false.

Thm (Gödel):
1930 No (reasonable) set of axioms is complete and consistent.

Ex: This statement is false.

Ex: $R = \{ S \mid S \text{ is a set and } S \notin S \}$

$$R \in R \implies R \notin R$$

$$R \notin R \implies R \in R$$

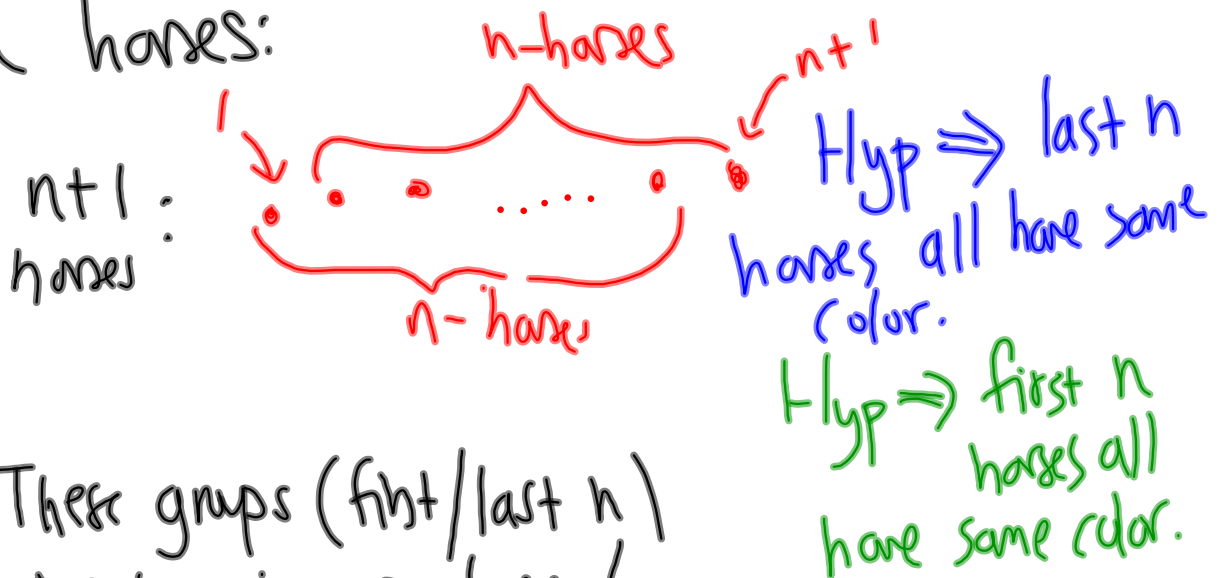
Problem R should not be a set!

Thm: All horses have the same color.

pf: Induction on $n = \text{number of horses}$.

$n=1$ obviously true.

Spse the statement is true for n horses:



These groups (first/last n)
overlap in $n-2$ horses!

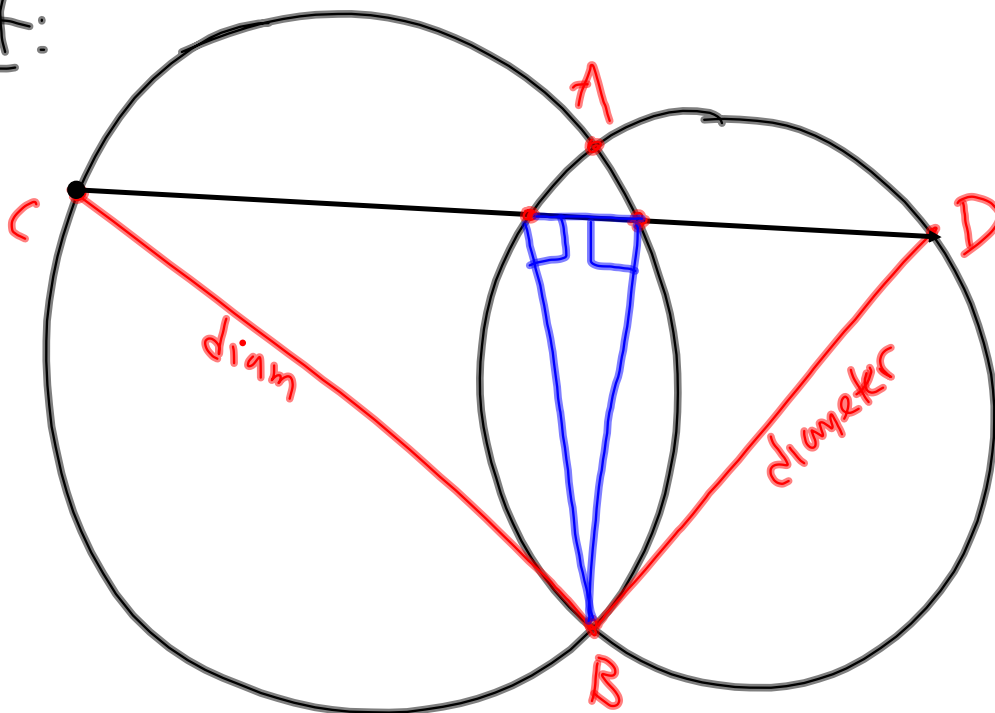
So the colors of these groups of n -horses are equal!

By induction, all horses have same color.

Moral: V. important to be careful
in proofs!

Ex: "Thm": \exists a triangle in plane
w/ two right angles.

Pf:



Real picture

