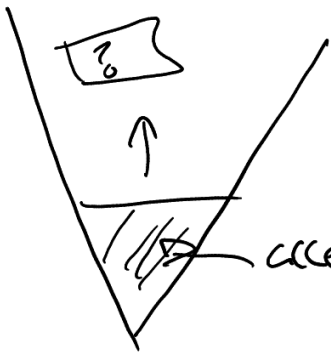


Q's / Conjecture → you 'think' it may be true?

you prove (show) conjecture is true



reference it:

- fact

- lemma

- thm

- corollary

accept to be, or be true

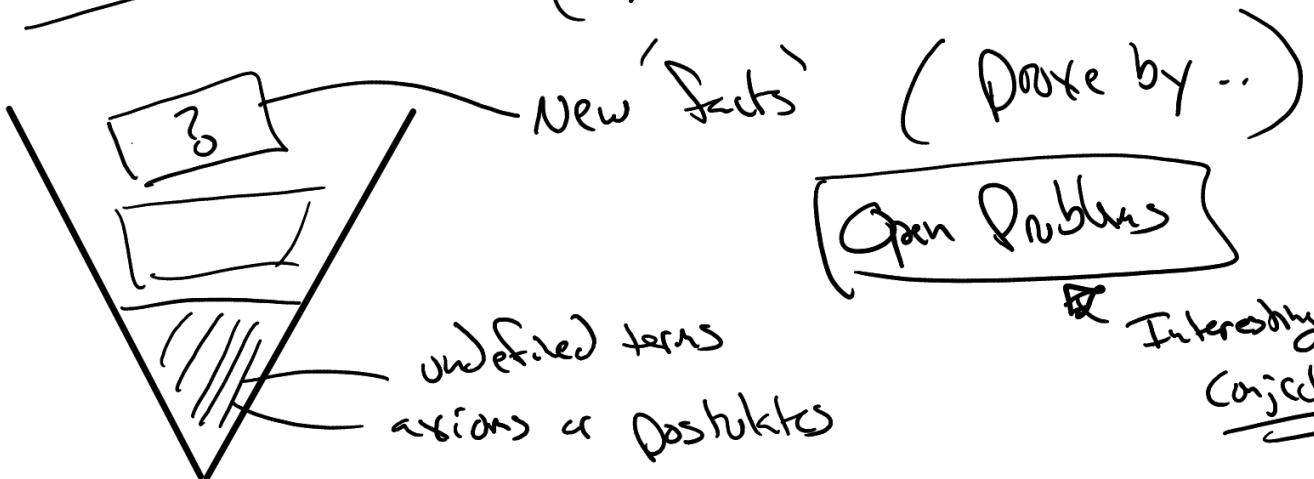
Text prove  $\sqrt{3}$  is irrational

to do this I need a fact

Call it a lemma → if  $n^2$  has a factor of 3 →  $n$  has a factor of 3  
used in the proof of  $\sqrt{3}$  is irrational

Axiomatic Method

(Make new knowledge)



New 'facts' (Prove by ..)

Open Problems

undefined terms  
axioms or postulates

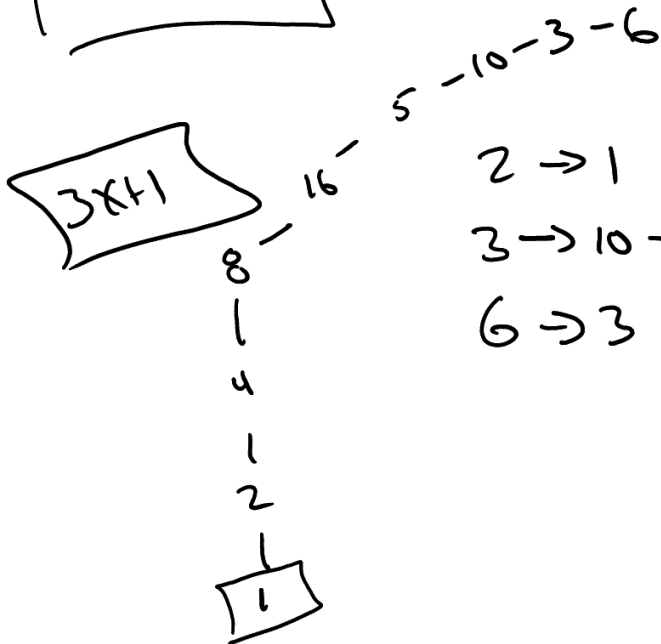
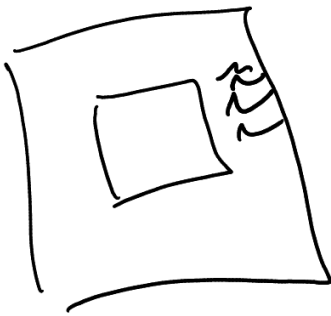
Interesting  
Conjectures

# Interesting Ques

$n \geq 3$

①  $x^n + y^n = z^n$

$\rightarrow 3^2 + 4^2 = 5^2$



$2 \rightarrow 1$

$3 \rightarrow 10 \rightarrow 5 \rightarrow 16 \rightarrow 8 \rightarrow 4 \rightarrow 2 \rightarrow 1$

$6 \rightarrow 3$

## Millennium Problems

Exam 1

1.1/1.2

11 probs

@ 10pts

(100pts = 100%)

Prop. Logic (+)

Proposition?

(2 probs)

Ops?

truth tables?

① Truth table everyone should know.

② (in parts) english  $\rightarrow$  sym

1.3

logical equiv (3 probs)

① show  $p \equiv \neg \neg p$  by a truth table

② show  $p \equiv \neg \neg p$  by discussion.

$$(p \rightarrow q) \equiv (\neg p \vee q)$$

③ use logical equiv.

$$\begin{aligned} ((p \wedge q) \vee \neg q) &\equiv (p \vee \neg q) \wedge (q \vee \neg q) \\ &\equiv (p \vee \neg q) \wedge q \end{aligned}$$

1.4/1.5

Quantifiers, Prop. Functions with binding  
(1 prob) - 11 parts

$$p \vee q \Leftrightarrow \neg(\neg p \wedge \neg q)$$

ex

$L(x, y)$ : "x loves y"

UD of  $x$  is people

UD of  $y$  is cats

$$\forall p \exists c L(p, c)$$

$$\exists c \forall p L(p, c)$$

1.6

Rules of Inference (2 probs)

① given an argument ... is it valid?

② given just premises  $\rightarrow$  you tell me valid conclusions.

1.7/1.8

Proofs:

(3 proofs)

①  $\sqrt{2}$  is irrational

(you also prove  
 $n$  even  $\rightarrow$   $n$  even  
in this proof)

② Case proof.

③ Existential proof.

$\frac{a}{b}$

