



Tips for doing well in CS123I

Quiz Time!



To gauge your ability to read and write proofs.
It won't affect your grade in CS123I.

Why do professors teach $1 + 1$ and then ask you $19.8 * 76$ in exams?

http://www.quora.com/Why-do-professors-teach-1+-1-and-then-ask-you-19.8*-76-in-exams

Short answer: practice, practice, practice!



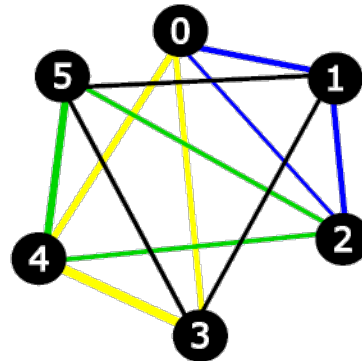
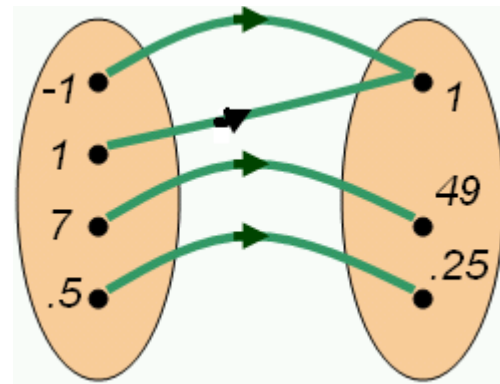
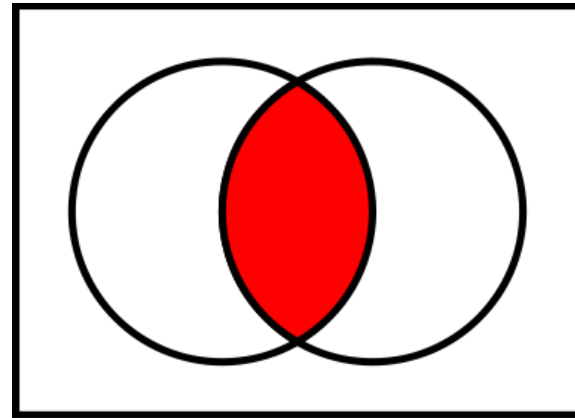
Axiomatic mathematics



- Axiomatic math is like learning to play a new sport/game
 - e.g. Congkak
- Axioms are the rules; they define the game
 - You don't question the rules
- Abandon your preconceived notions
 - Just follow the rules

Draw it out

- Venn diagrams
- Dots and arrows
- Graphs



Work out simple examples by hand

Expression for sum of first n odd numbers

n	Terms	Sum
1	1	1
2	1+3	4
3	1+3+5	9
4	1+3+5+7	16
5	1+3+5+7+9	25

Guess: the formula is n^2

Study definitions carefully

- What does it say?
- What does it **NOT** say?
- Compare definitions

$$\textit{even}(n) \equiv \exists k \quad n = 2 \times k$$

$$\textit{square}(n) \equiv \exists k \quad n = k \times k$$

- *Find something even and square*
- *Find something even and not square*
- *Find something not even and square*
- *Find something not even and not square*

Direct Proof

- By appealing to definitions
- By using other theorems
- By construction
- By exhaustion (aka cases, brute force)

Indirect proof

- By contradiction
- By contra-positive
- By induction
- By reduction

Learn proof techniques

<http://www.cube20.org/>





Invalid proof techniques

<http://www.themathlab.com/geometry/funnyproofs.htm>

By intimidation



Because I said so!

By tautology

- Assume A is true.
- This implies B is true, which implies C is true ...
- Which finally implies A is true.

By choice

- Let A be the number such that this proof works

By obviousness

- The statement is so obvious we omit the proof.

By postponement

- The proof is so long and tedious that we list it in the appendix.

By profanity

- (omitted)

By plausibility

- It sounds good, so it must be true.

By lack of time

- Because we are running out of time, I'll leave the proof to you.

By regurgitation

- List all known definitions and theorems, even if they are irrelevant.

hunter

- Hope that the ~~reader~~ finds the subset of things that constitute a proof.

