The Not So Clever but
Definitely Lazy CS Student

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CS253
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Meet Alice.

• This is Alice.

Hi Alice
Alice has problems.

- 1) Alice is lazy.
- 2) Alice is bad at math.
- 3) Alice is a CS major.
Alice has homework.

• Dr. Purple has assigned Alice some homework.
Alice is lazy.

- Alice, being lazy, puts off the homework to the last night. Now it's 2am in the Taylor Lab.
Alice has problems

• Alice, being quite stubborn, does not think that math is important to CS! In fact (as reflected by her grades in algorithms), she generally does not pay attention in class.
Alice can program

- To Alice’s credit, she can program pretty well.
- But back to Alice’s problem.
Alice is tired.

- It’s 2am. Alice is tired. Alice’s program doesn’t work. See?
Alice is clever. Too Clever.

- Alice has an infinite loop. She thinks. Alice’s program might just run for a really really long long time.
- Alice decides to write a program to see if her program will ever finish. Clever girl.

I’m smarter than dumb old Dr. Purple.
Bob does not think this is a good idea.

• Bob is also lazy and in the lab.
• Bob likes math.
• Bob does not think that would be wise investment of time at this juncture.
Alice gets to work.

- Vrooooooooooom!
- Alice is typing so fast she may have just killed someone.
Bob is still dubious

- Despite Alice’s apparent progress (measured in lines), Bob has his doubts. This might be a good time to mention that Bob is good at math.
Bob’s yammering

• Bob is saying something about some guy named Turing.
• Alice isn’t buying it.
Bob explains Turing.

- Bob claims that what Alice is trying to do is impossible, and if she’d just pay attention in class she’d know that.
- Alice isn’t listening.
Alice is tired. Bob is tired of Alice

- No really Bob claims.
- Bob tells Alice:
  - Lets assume your program works, think about it. What would happen if you gave your program itself as input?
  - Set up a wrapper program where if the input program doesn’t run forever it infinitely loops, and if it does run forever it halts.
Alice might have a problem (according to Bob)

• Now simulate the program on itself. There are two possibilities.
  – The program halts. But that means the program runs forever, and should not have halted in the first place!
  – The program runs forever. This either means that the program runs forever and the program doesn’t work, or that it halts and the program should have halted.

• Either way, Alice has a problem.
Alice doesn't have a problem.

- La la la....

- code is pretty colors!
  La la la
Sometime later...

- Alice has a problem.
- It’s 9am, class is starting.
- Bob is long gone.
- Alice’s program doesn’t work.
Alice has to turn in her code.

- Dr Purple reads her code, and writes very strongly worded comments.
- Alice feels dumb (and tired).
Bob told you so.

- Alice decides that clearly this was just a fluke, and her current methods are doing just fine!
- Bob is just a dumb boy, if she had more time she would have solved it.

If only Grays hadn’t been on...
30 years later

- Bob knows if $P = NP$
- Alice writes portions of the Linux kernel... Sometimes they even work!
- Dr Purple is exactly the same in every way shape and form.