What's wrong with this proof?

If you figure it out, don't call it out loud – let others ponder it as well.

1.	Let a and b be non-zero such that	$a = b$
2.	Multiply both sides by a	$a^2 = ab$
3.	Subtract b^2	$a^2-b^2 = ab-b^2$
4.	Factor both sides	$(a-b)(a+b) = b(a-b)$
5.	Divide by $(a-b)$	$a+b = b$
6.	Since $a = b$, we replace b with a	$b+b = b$
7.	Combine terms	$2b = b$
8.	As b is non-zero, divide it out	$2 = 1$

Q.E.D. (Latin for "which was to be proven")

CS 231: Discrete Math

Spring 2017

So…. What is it?

- Discrete mathematics … is the study of mathematical structures that are fundamentally discrete, in the sense of not supporting or requiring the notion of continuity (Wikipedia)
- It is not Calculus

Why discrete math?

- It is the Mathematics of computing:
  - Sequences
  - Digital logic (how computers compute)
  - Algorithms
  - Assuring programming correctness
  - Probability and gambling (really!)
  - Combinatorics and Graph Theory.
- It teaches reasoning and has immediate "real world" applications

Proofs

- How do you know something is correct?
- How do you know when something is not correct?
  - Such as showing that 2=1?
- How do you think logically?
- How do you think to solve problems?

What's wrong with this proof?

If you figure it out, don't call it out loud – let others ponder it as well.

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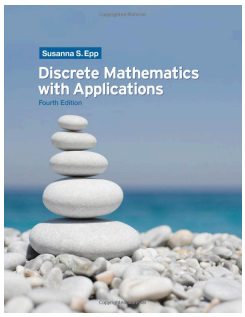
Q.E.D. (Latin for "which was to be demonstrated")

Textbook

- Susanna Epp
- Discrete Mathematics with Applications, 4th edition
  - ISBN 0495391328
- Sorry about the price!



Textbook

- Attending lectures is NOT a substitute for reading the text.
- Try to read the text BEFORE coming to class
- Do as many exercises as you can – some have solutions at the back

Course website and syllabus…

- www.cs.brynmawr.edu/cs231

Where did the money go?

Three people check into a hotel. They pay $30 to the manager and go to their room. The manager suddenly remembers that the room rate is $25 and gives $5 to the bellboy to return to the people. On the way to the room the bellboy reasons that $5 would be difficult to share among three people so he pockets $2 and gives $1 to each person. Now each person paid $10 and got back $1. So they paid $9 each, totaling $27. The bellboy has $2, totaling $29. Where is the missing $1?