Lecture 4: Solving equations — Math 345

Tuesday, September 28, 2010 — Jim Fowler

Textbook

This lecture discusses section 2 of the textbook.

Homework

The homework is due Thursday, September 30, 2010.

From Section 2 of the textbook, do exercises 19 and 20.

We did this example last time in class, so it shouldn't be too hard.

contradiction

what is a contradiction? $Q \wedge \neg Q$

Why does this work?

look at a truth table

how to prove a negative statement

proof by contradiction

example: $((P \Rightarrow Q) \wedge \neg Q) \Rightarrow \neg P$.

Versus contrapositive

Want to prove $P \Rightarrow Q$?

Method of Contradiction: Assume P and Not Q and prove some sort of contradiction.

Method of Contrapositive: Assume Not Q and prove Not P.

example from textbook

if x^2 is even, then x is even.

example: diophantine equation

There are no positive integer solutions to the diophantine equation $x^2 - y^2 = 1$

proof: factoring

example: largest number

theorem: there is no largest integer

last digit of squares

If n is a perfect square, then n ends with a $0, 1, 4, 5, 6$ or 9.

Ramsey theory

There are six people at a party. At least 3 know each other, or 3 don't.