CSC165 fall 2019

Mathematical expression: contradiction, induction

Danny Heap
csc165-2019-09@cs.toronto.edu
BA4270 (behind elevators)
Web page:
http://www.teach.cs.toronto.edu/~heap/165/F19/
416-978-5899

Using Course notes: Proof

contradiction specializes contrapositive

$P_1 \wedge P_2 \wedge \cdots \wedge P_k \Rightarrow Q$

infinitude of primes

induction $\simeq$ "and so on..."

$7^n \equiv 1 \pmod 6$

statements as dominoes

$7^0 \equiv 1 \pmod 6$ $\quad$ $7^1 \equiv 1 \pmod 6$ $\quad$ $7^2 \equiv 1 \pmod 6$ $\quad$ $7^3 \equiv 1 \pmod 6$ $\quad$ $7^4 \equiv 1 \pmod 6$ $\quad$ $7^5 \equiv 1 \pmod 6$ $\quad \cdots$ "etc."

$7^0 \equiv 1 \pmod 6$ $\quad$ $7^1 \equiv 1 \pmod 6$ $\quad$ $7^2 \equiv 1 \pmod 6$ $\quad$ $7^3 \equiv 1 \pmod 6$ $\quad$ $7^4 \equiv 1 \pmod 6$ $\quad$ $7^5 \equiv 1 \pmod 6$ $\quad \cdots$ "etc."

induction format

- predicate
- base case
- inductive step

prove $\forall n \in \mathbb{N}, 7^n \equiv 1 \pmod 6$

discover, then prove sum of first n numbers result

discover, prove sum of first n cubes result

modular multiplication for more than pairs

Notes