Massachusetts Institute of Technology
6.042J/18.062J: Mathematics for Computer Science
Professor David Karger

Tutorial 2
February 18, 1997

Problems for Tutorial 2

1 Warmup

Prove by induction on k that

$$5 \mid (3^{2k} + 4^{k+1})$$

for any integer $k \geq 0$.

2 Peano Strikes Back

Recall that addition was defined by:

D1) $\forall n \in \mathbb{N}, n + 0 = 0 + n$

D2) $\forall n, m \in \mathbb{N}, n + m' = (n + m)'$

Prove by induction the cancelation law of addition.

$$\forall n, m, k \in \mathbb{N}, n + k = m + k \implies n = m$$

3 Handshaking Problem

I recently went to a party with my spouse; there were 11 other married couples there. A lot of handshaking happened (but of course no one shook hands with their spouse). At the end, it turned out that for every k from 0 to 22, someone other than me had shaken hands with exactly k people. How many people did I shake hands with? Prove it.