Home Assignment 2

Discrete Mathematics – CSC/MAT A67, Winter 2024

PROOF BY CONTRADICTION

Prove the following statements by way of contradiction:

1. $\forall n \in \mathbb{N}$, if 3n+4 is odd then n is odd.

It suffices to prove the following: When $n \in \mathbb{N}$ and 3n+4 is odd, n is also odd.

Assume towards a contradiction that n is even. Then, n=2k for some $k \in \mathbb{N}$. By basic arithmetic, we deduce that 3n+4 = 3(2k)+4 = 6k+4 = $2 \cdot$ (3k+2). Hence, 3n+4 is an even number. This contradicts the fact that 3n+4 is odd. QED

2. $\forall n \in \mathbb{N}$, there exist more than n prime numbers. (You can use the fundamental theorem of arithmetic: Every positive natural number can