

# CS344: Design and Analysis of Computer Algorithms

## Homework 1

**Group Members:** Stephen Kuo, Derek Mui

1.11) Is  $4^{1536} - 9^{4824}$  divisible by 35?

**Answer:**

temp

1.12) What is  $2^{2^{2006}} \bmod 3$

**Answer:**

$$2^{2^{2006}} = 4^{2006} = 4^{2^{1003}} = 16^{1003} = (15 + 1)^{1003}$$

We know 15 is divisible by 3, so that leaves us with  $1^{1003}$ .

Thus, the answer is 1

1.13) Is the difference of  $5^{30,000}$  and  $6^{123,456}$  a multiple of 31?

**Answer:**

temp

1.25) calculate  $2^{125} \bmod 127$  using any method you choose

**Answer:**

temp

1.33) Give an efficient algorithm to compute the least common multiple of two  $n$ -bit numbers  $x$  and  $y$ , that is, the smallest number divisible by both  $x$  and  $y$ . What is the running time of your algorithm as a function of  $n$ ?

**Answer:**

temp

1.39) Give a polynomial-time algorithm for computing  $a^{b^c} \bmod p$ , given  $a$ ,  $b$ ,  $c$ , and prime  $p$ .

**Answer:**

temp

Problem)

**Answer:**

temp