CSE 411: Complexity and Advanced Algorithms
Monsoon 2018
IIIT Hyderabad

Homework 2, Due: August 27, 2018

Each question is for 5 points.

1. Write appropriate quantified formulae for the following mathematical statements.

a. There are infinitely many prime numbers.

b. Every pair of positive integers (at least 1) have a unique GCD.

2. Show that the problem of sorting is in LogSpace. Note: the output of the computation is the sequence of input numbers in ascendnig order. What is the time taken by your LogSpace sorting algorithm?

3. Show that that class PSpace of languages is closed under the operations union and intersection.

4. An alternative definition of NP is that a language L is in NP if for every w in L, there exists a (witness) string y of length polynomial in $|w|$, and a deterministic polynomial time TM M such that M on input w and y accepts. Show that the standard definition of NP in terms of nondeterminstic polynomial time computations vs. the one defined above are identical.