CSE 411: Complexity and Advanced Algorithms
Monsoon 2018
IIIT Hyderabad

Homework 1, Due: August 9, 2018

Each question is for 5 points.

1. Design deterministic Turing machines for the following computations.

   - $f(n) = 2^n$, where n is a positive integer.
   - $f(m, n) = \log_n m$ where m and n are positive integers. You can compute the answer to be the rounded value of the logarithm.

2. Show that NP $\subseteq$ PSPACE.

3. Given a directed graph $G = (V, E)$ and two distinct nodes s and t in $V(G)$, find a proecure that returns the set of nodes that are NOT in any path from s to t. What is the runtime of your procedure?

4. Suppose that n T-shirts are handed over at a promotional event to n participants uniformly at random. Participants were not limited to receiving one T-shirt or not required to receive at least one T-shirt. What is the expected number of participants who did not receive any T-shirt.