COMP 330 - Fall 2010 - Assignment 3

Due 8:00 pm Oct 25, 2010

General rules: In solving this you may consult the textbook. You should drop your solutions in the assignment drop-off box located in the Trottier Building on the 3rd floor left of the elevators. Check the website of the course, "http://www.cs.mcgill.ca/∼hatami/comp330" for possible corrections.

1. (a) (40 points) Draw the state diagram of a Turing Machine that decides the strings of the form $\underline{u < v}$ where u and v are two *positive* integers in binary and the string is valid as an inequality. Here the alphabet is $\{0, 1, <\}$. (For example $10 < 100$ is in the language but $11 < 10$ is not; Also note that the leftmost digit of the binary representation of every positive integer is 1.) Explain why your Turing Machine works.

   (b) (10 points) Run your Turing Machine on $\underline{100 < 11}$. You have to list the sequence of configurations.

2. (a) (40 points) Draw the state diagram of a Turing Machine that accepts the language $\{0^i+0^j = 0^{i+j} \mid i, j > 0\}$ over the alphabet $\{0, +, =\}$. Explain why your Turing Machine works.

   (b) (10 points) Run your Turing Machine on $00 + 0 = 000$. You have to list the sequence of configurations.