

Due at the start of class Tuesday, November 22, 2005 (or Tuesday, November 29).

Problem 1.

- a. Give a Turing Machine that takes as input two binary integers, separated by a comma, decides if the first integer is larger. If it is larger the machine should print “Y”, otherwise it should print “N”, on an otherwise blank tape.
- b. Give a Turing Machine that takes as input two binary integers, separated by a comma, and prints the larger one on an otherwise blank tape.

Problem 2.

- a. Give a Turing Machine that takes as input a string $w \in \{a, b\}^*$ and prints out w^R .
- b. Give a Turing Machine that takes as input a string $w \in \{a, b\}^*$ and prints “Y” if $w = w^R$ and prints “N” if $w \neq w^R$.

Problem 3.

- a. Give a primitive recursive function that takes as input two numbers, decides if the first number is larger. If it is, the value should be 1; otherwise the value should be 0.
- b. Give a primitive recursive function that takes as input two numbers, returns the larger of the two numbers. In other words, the function should return $\max(m, n)$.

Problem 4. Show that $\text{prime}(n)$ is primitive recursive, where $\text{prime}(n) = 1$ if n is prime, and $\text{prime}(n) = 0$ if n is not prime.