Homework #10
CS322 / KAIST 2011 Fall
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Exercise 1. (10pt) Here are some possible objections to the Church-Turing Thesis. For this objection, say if you think it is reasonable or not, and explain why. (You won't be graded based on whether your answer is "right" or "wrong", but based on how well you explain your answer.)

Look at this computer program:

```
int F(int n) {
        if (n == 1) return 1;
        else return F(n - 1) + F(n - 2);
}
```

This program uses recursion: A procedure makes a subroutine call to itself. But Turing Machines do not support recursion. Therefore Turing Machines are not as powerful as ordinary programming languages, and the Church-Turing thesis is false.

Exercise 2. (10pt) Show that each of the following functions is primitive recursive.

a. $f:N^2 \rightarrow N$ defined by $f(x,y) = \max\{x, y\}$

b. $f:N \rightarrow N$ defined by $f(x) = \lfloor \sqrt{x} \rfloor$ (the largest natural number less than or equal to $\sqrt{x}$)