Math 135: Discrete Mathematics, Spring 2010
Worksheet 7

1. The conventional algorithm for evaluating a polynomial $a_n x^n + a_{n-1}x^{n-1} + \ldots + a_1 x + a_0$ at $x = c$ can be expressed in pseudocode by:

```
procedure polynomial(c, a_0, a_1, ..., a_n)
   power := 1
   y := a_0
   for i := 1 to n
         power := power *c
         y := y + a_i* power
   return y
```

   (a) Evaluate $3x^2 + x + 1$ at $x = 2$ by working through each step of the algorithm and showing the values assigned to each variable at each step.

   (b) Exactly how many multiplications and additional are used to evaluate a polynomial of degree n at $x = c$? (You may ignore additions used to increment the loop variable i.)

2. (a) Design an algorithm that finds the first term of a sequence of positive integers that is less than the immediately preceding term of the sequence. (Try to describe what your algorithm should do in words, and then write pseudocode afterwards.)

   (b) Determine the worst case complexity of your algorithm from part (a).