

Math 135: Discrete Mathematics, Fall 2010

Worksheet 7

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

```
procedure polynomial( $c, a_0, a_1, \dots, a_n$ )
  power := 1
   $y := a_0$ 
  for  $i := 1$  to  $n$ 
    power := power *  $c$ 
     $y := y + a_i * \text{power}$ 
  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 additions 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).