

# CSci 243 Homework 7

\*\*My name\*\*

- (2 points each) Give a recursive definition for each of the following sequences  $\{a_n\}$  for  $n = 1, 2, 3, \dots$ 
  - $a_n = 4n - 2$
  - $a_n = n(n + 1)$
  - $a_n = \left(\frac{1}{2}\right)^n$
- For string  $w = a_1a_2 \cdots a_n$ , the reversal of the string is defined as  $w^R = a_n \cdots a_2a_1$ .
  - (1 point) What is  $\epsilon^R$ ? What is  $(10110)^R$ ?
  - (4 points) Give a recursive definition of the reversal of a string.
  - (6 points) Use structural induction to prove that  $(w_1w_2)^R = w_2^Rw_1^R$ . (Use your recursive definition).
- (7 points) A palindrome is a string that reads the same forward and backward, i.e.,  $w = w^R$ . Give a recursive algorithm in pseudocode that checks whether a given string  $w$  is a palindrome.
- (7 points) Give a recursive algorithm in pseudocode that finds the maximum number among  $n$  integers.
- (9 points) Use the iterative approach to solve the following recurrence relations.
  - $a_n = a_{n-1} + 3$  and  $a_0 = 0$
  - $a_n = a_{n-1} + n$  and  $a_0 = 0$
  - $a_n = (n + 1)a_{n-1}$  and  $a_0 = 2$