

**CSci 3501 Assignment 2**  
**Due Friday, September 11 in class**

**Problem 1 (5 points).** For each of the following statements please say if it is true or false and **explain your answer**.

- $n^2 + 5n + 3 \in o(n^3)$
- $n^2 + 5n + 3 \in \omega(n^2)$
- $n^2 + n \log_2 n \in O(n^2)$
- $n + n \log_2 n \in O(n)$
- $3 \log_2 n \in \Theta(\log_2 n)$

**Problem 2 (6 points).** Prove the following:

- $n! \in \omega(2^n)$
- $n! \in o(n^n)$
- $g(n) \in o(f(n))$  then  $f(n) + g(n) \in \Theta(f(n))$ .

**Problem 3 (2 points).** Exercise 3-4 p. 59 part g. You have to either prove the claim or give a counterexample.

**Problem 4 (5 points).** Exercise 2.1-2 p. 21. Write pseudocode for the procedure (minor differences from the book in pseudocode notations, such as adding brackets or using = for assignment statements, are OK).

**Additionally**, please write the loop invariant for the outer loop of the new procedure and show that it holds. You may assume the needed property of the inner loop, as we did in class.