

**Homework 1**  
**Algorithms Analysis and Design (501435-3)**  
**Fall 2023**

**Due: Saturday October 7, 2023, 11:59 pm via Blackboard (Firm deadlines)**

- Show that  $6n^2+8n+2$  is  $O(n^2)$
- Show that  $20n+6$  is  $O(n)$
- Find the closed form for the following series:
  - a)  $1 + 2 + 3 + 5 + \dots + n$
  - b)  $1 + x^2 + x^3 + \dots + x^n$  where  $x$  is constant and  $x > 1$
  - c)  $1 + x^2 + x^3 + \dots + x^n$  where  $x$  is constant and  $x < 1$
  - d)  $1 + (1/2) + (1/3) + \dots + (1/n)$
- Use the iteration method to solve the recurrence  
$$T(n) = 4T(n/2) + n^2$$
- Exercise 4.3-1
- Exercise 4.3-2
- Exercise 4.3-3
- Exercise 4.3-9
- Exercise 4.4-1
- Exercise 4.4-2
- Exercise 4.4-4
- Exercise 4.4-6
- Exercise 4.5-1
- Exercise 4.5-3
- Exercise 4.5-4
- Problems 4-1
- Problems 4-3