

**COT 5507: Analytic Methods in Computer Science
Fall 2014**

Assignment 1

Due: 2 Oct 2014

1. (25 points) Prove that the sum of the cubes of the first n positive integers is $n^2(n+1)^2/4$, *using induction*.

2. (25 points) Solve the following recurrence *using the repertoire method*:

$$\begin{aligned}T(0) &= 1 \\T(n) &= T(n-1) + n + 2^n, \quad n > 0\end{aligned}$$

3. (25 points) Exercise 2.20.

4. (25 points) Solve the following recurrence using *summation factors*:

$$\begin{aligned}T(0) &= 1 \\3(n+1)^2 T(n) &= n^2 T(n-1) + n (2/3)^n, \quad n > 0\end{aligned}$$