CS3233 Homework 4

Due on 3 September 2000 at 10:00am 100 marks
Slip your assignment under my office door. My office is located at S16 #08-05.
Topics: Homework 3 follow-up and Brute Force

1. The *Maximum Subsequence Sum* problem is defined as follows. Given an array $A[1 \ldots n]$ of integers, find values of i and j with $1 \leq i \leq j \leq n$ such that
$$\sum_{k=i}^{j} A[k]$$
is maximized. Devise an algorithm for solving the maximum subsequence problem in time $O(n)$. [20]

2. Consider the problem of exhaustively generating all permutations of n things. Suppose $A[1 \ldots n]$ contains n distinct values. Write a java program that generates all permutations of $A[1 \ldots n]$. Submit your program together with test runs to support its correctness. [25]

3. Consider the problem of generating all combinations of r things chosen from n, for some $0 \leq r \leq n$. Let's assume that the n items to be chosen from are the natural numbers $1, 2, \ldots, n$. Write a java program that generates all combinations of r things drawn from n. Submit your program together with test runs to support its correctness. [25]

4. Write a java program that inputs a natural number C, and outputs all the ways that a group of ascending postive numbers can be summed to give C. For example if $C = 6$, the output should be

```
1+2+3
1+5
2+4
6
```

and if $C = 10$, the output should be

```
1+2+3+4
1+2+7
1+3+6
1+4+5
1+9
2+3+5
2+8
3+7
4+6
10
```

Submit your program together with test runs to support its correctness. [30]