

## Lab 4 (15 Sep 2020)

**Problem 1 [N Queens]** Write a program to print all the possible solutions to the N-Queens problem. (The value N should be configurable, for e.g. part of the input to the problem.)

**Problem 2 [Subset Sum]:** Write a recursive program to find the total number of ways to attain some value  $V$  from a set of integers using only the *plus* and *minus* operators. For e.g. for the set  $\{2, 5, 3, -6\}$ , the value  $V=6$  can be attained four possible ways as shown below:

$$-2 + 5 + 3$$

$$-2 + 5 - 3 - (-6)$$

$$- (-6)$$

$$+ 2 - 5 + 3 - (-6)$$

Can you modify your program to print each of the expressions that results in the value  $V$  (and not just the number of possible ways).

**Problem 3 [Traveling Salesman Problem]:** Implement a naive backtracking solution for the Traveling Salesman problem. Now implement the branch and bound algorithm discussed in the lecture. Assume that the distance between any two cities (vertices) is positive.