# Homework 11

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due 21 May, 2018, 23:55 hours

## Problem 4

a) **Solution:** Obviously, we can make a graph out of the puzzle board. We can do it in a way that each cell on the board is a node, therefore $V = \{0, 1, ..., n^2 - 1\}$. Let $B[i, j]$ be an entry on the board $B$ and let the board have dimensions $n \times n$. Also consider a function $f(i, j) = in + j$, where $f : n \times n \to V$, i.e., maps coordinates $i, j$ to the index of the node in $V$. Then each node $v \in V$, where $f(i, j) = v$ will have neighbouring edges with the nodes $M = \{f(i + B[i, j], j), f(i - B[i, j], j), f(i, j + B[i, j]), f(i, j - B[i, j])\}$, if, of course, nodes in $M$ actually are in interval $[0, n^2 - 1]$.

Mathematically:

$$V = \{0, 1, ..., n^2 - 1\}$$
$$E = (v \times M)$$

where $v \in V$ and elements in M are in interval $[0, n^2 - 1]$.

b) Please check *problem4.cpp* and *problem4.h*.

c) Please check *problem4.cpp* and *problem4.h*.