In the mathematical discipline of graph theory, a **vertex cover** (sometimes node **cover**) of a graph is a set of **vertices** such that each edge of the graph is incident to at least one **vertex** of the set.

Unfortunately, the ***Vertex Cover*** problem is NP-complete – which means it is unlikely that there is an efficient algorithm to solve it exactly. Its optimal solution basically does not reside in the polynomial “realm” of complexity.

However, there is a special type of algorithms called *approximation algorithms* which even though do not yield an optimal (exact) solution to a problem, they generate an approximation which is (or should be) close enough to the optimal one.

Requirements:

* Do some research on approximation algorithms and what they “sound” like
* Find a good approximation algorithm for the Vertex Cover problem
* Implement and test this approximation algorithm on a graph of your choice
* Write a short 1-2 pages description of your understanding of approximation algorithms, approximation factors (or *degree* of approximation) and heuristics.
* Be ready to answer any question in class related to this particular algorithm and be prepared to briefly explain it and its approximation
* Have some very brief knowledge of what ***P=NP*** means

Most approximations which you will find are not at all difficult but very elegant.

But, if by any chance you “stumble” upon an optimal solution for this problem which runs in polynomial time, take a deep, deep breath and check it again for a few other cases. If you’re certain that the solution is polynomial for all cases and the science community ends up approving this, know that in the next 3-6 months you will be more famous than Bill Gates and Elon Musk combined as you managed to solve the most difficult question in Computer Science:

***Is P=NP ?***

Due date(s):

30411 – 04.05.2015 (before 12:00 if you want review and before 23:59 if you want a grade)  
30414 – 05.05.2015 (before 12:00 if you want review and before 23:59 if you want a grade)

*Extra assignment worth = 0.5p*