ATHENS UNIVERSITY
OF ECONOMICS
AND BUSINESS

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DEPARTMENT OF
INFORMATICS

Ειδικά Θέματα Αλγορίθμων
Ασκήσεις Φροντιστηρίου #7
Vertex Cover and Set Cover

1. Prove that the set of edges picked from Matching-based VC algorithm forms a maximal matching in the graph G.

2. Consider the following heuristic to solve the vertex-cover problem. Repeatedly select a vertex of highest degree, and remove all of its incident edges. Give an example to show that this heuristic does not provide an approximation ratio of 2. (Hint: Try a bipartite graph with vertices of uniform degree on the left and vertices of varying degree on the right.)

3. Give an efficient greedy algorithm that finds an optimal vertex cover for a tree.

4. Show that the decision version of the set-covering problem is NP-Complete by reducing the vertex-cover problem to it.