ΟΙΚΟΝΟΜΙΚΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΑΘΗΝΩΝ
ATHENS UNIVERSITY OF ECONOMICS AND BUSINESS

ΣΧΟΛΗ ΕΠΙΣΤΗΜΩΝ & ΤΕΧΝΟΛΟΓΙΑΣ ΤΗΣ ΠΛΗΡΟΦΟΡΙΑΣ
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ΤΜΗΜΑ ΠΛΗΡΟΦΟΡΙΚΗΣ
DEPARTMENT OF INFORMATICS

Ειδικά Θέματα Αλγορίθμων
Ασκήσεις Φροντιστηρίου #9
Approximation Algorithms

1. Give a greedy approximation algorithm for the MAX COVERAGE problem.

(MAX COVERAGE: Given a universe $\mathcal{U} = \{e_1, e_2, ..., e_n\}$, a list of sets $S_i \subseteq \mathcal{U}$ (possibly overlapping) and a bound k, the goal is to pick k sets $S'_1, S'_2, ..., S'_k$ such that $|\bigcup_{i=1}^{k} S'_i|$ is maximized.)

2. a) Design an optimal algorithm for the fractional version of KNAPSACK problem.
b) Design an approximation algorithm for the 0-1 version of KNAPSACK problem.

(KNAPSACK: As input, Knapsack takes a set of n items, $S = \{a_1, ..., a_n\}$, each with a weight $w(a_i) \in \mathbb{Z}^+$ and a value $v(a_i) \in \mathbb{Z}^+$, a "knapsack capacity" $B \in \mathbb{Z}^+$.
Find a subset of objects whose total weight is bounded by B and total value is maximized.)