Department of Mathematics and Computer Science
University of Southern Denmark, Odense

April 2, 2013
LMF

DM833 – Weekly Note 1

Lectures in week 15

Monday, April 8

- Introduction to the course.
- Section 1.0–1.1: Introduction to approximation algorithms, with Vertex Cover as an example.
- We will discuss the following exercises. You will have time to work on them during class, so you do not have to prepare them beforehand.
  - Exercise 1.1
  - Exercise 1.3 (In the 2001 printing of the book, there is a typo in the hint: $|S|$ should be replaced by $\lceil |S|/2 \rceil$.)
- Section 2.0–2.1: Set Cover and the Greedy Algorithm.

Tuesday, April 9

- We will discuss the following exercises. You will have some time to work on them during class, but it is a good idea to look at them beforehand.
  - Exercise 1.4. Hint: For the tight example, you may consider a bipartite graph with m vertices in one partition and approximately mH_m vertices in the other.
  - Assume that you have an algorithm for finding a minimum vertex cover in a graph. Explain how you can use the algorithm for finding a maximum independent set.
    Does this mean that you can use Algorithm 1.2 for approximating a maximum independent set?
- Section 3: Steiner Tree and TSP

Wednesday, April 10

- Exercises:
  - Although the vertex cover problem is NP-hard for general graphs, there are graph classes that allow for efficient algorithms.
    Design an algorithm that finds an optimal vertex cover for a tree in linear time.
  - Exercise 2.1
  - Exercise 2.2. Is the lower bound of $1/2$ tight?
  - Exercise 2.8
- If time permits:
  Section 4.1: Multiway Cut