CSE 565	Martin Fürer	Algorithm Design and Analysis

Assignment 5 Given: 9/27/18 Due: Wednesday 10/3/18

Exercises

Exercises are for your own practice. Don't hand them in.

1. (Maximum Spacing) You are given a graph G with 8 vertices $v_1, \ldots, v_8$ and a number k=3. Between v_i and v_j, there is an edge with weight $i \cdot j$. Find a clustering with k clusters of maximum spacing.

2. Solve Exercise 29, Chapter 4 on page 203 of the Textbook.
   (Degree sequences for graphs)

Problems

Problem solutions have to be handed in. A subset of them will be graded.

1. [5+10=15 points] (Huffman code)

   (a) You have an alphabet $\{a, b, \ldots, h\}$ with frequencies $1, 2, \ldots, 8$. Draw a tree defining a Huffman code.

   (b) Assume you have an alphabet $A = \{a_1, \ldots, a_n\}$ where each character has a different weight. Find a small example where Huffman's algorithm could nevertheless create two (or more) essentially different Huffman codes.

   Here, we consider two Huffman codes to be essentially different, if there is a length ℓ such that the number of characters encoded by binary strings of length ℓ is different for the two codes.

2. [20 points] Solve Problem 7, Chapter 4 on page 191 of the Textbook.
   (A greedy algorithm for El Goog)

3. [20 points] Solve Problem 21, Chapter 4 on page 200 of the Textbook.
   (MST for near-tree)