

# Assignment 4

1. (CLRS page 428 16.2-7.)  
Suppose you are given two sets  $A$  and  $B$ , each containing  $n$  positive integers. You can choose to reorder each set however you like. After reordering, let  $a_i$  be the  $i$ -th element of set  $A$ , and let  $b_i$  is the  $i$ -th element of set  $B$ . You then receive a payoff of  $\prod_{i=1}^n a_i^{b_i}$ . Give an algorithm that will maximize your payoff. Prove that your algorithm maximizes the payoff, and state its running time.
2. Suppose the symbols  $a$ ,  $b$ ,  $c$ ,  $d$ ,  $e$  occur with frequencies  $1/2$ ,  $1/4$ ,  $1/8$ ,  $1/16$ ,  $1/16$ , respectively.
  - 2.1 What is the Huffman encoding of the alphabet?
  - 2.2 If this encoding is applied to a file consisting of 1,000,000 characters with the given frequencies, what is the length of the encoded file in bits?