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# Homework #4

**Part A**

1. Solved exercise #1 in Chapter 5  
     
   a. Pseudo code  
     
   b. Problem instance of size 10  
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2. Solved exercise #2 in Chapter 5  
   a. Pseudo code  
   b. Problem instance of size 10  
     
   Divide into: A = [3, 7, 6, 2, 1] and B = [9, 5, 10, 4, 8]  
   1st half: A = [3, 7, 6, 2, 1] divides into [3, 7] and [6, 2, 1]

Result: buy on day 5 which has price of 1 and sell on day 8 which has price of 10  
  
c. Time complexity:

**Part B**

1. Chapter 5, Exercise 2 (Significant inversion problem)  
   a. *Model of problem:* Given a sequence of n numbers . Let’s call a pair a significant inversion if . Give an *O(n* log n) algorithm to count the number of significant inversions between two orderings.  
     
   b. *Algorithm pseudo code*  
   *Time complexity:*   
     
   d. Implementation
2. Chapter 5, Exercise 6 (Local minimum problem)  
   a. *Model of problem*  
   Given an n-node complete binary tree T, where n = 2d - 1 for some d. Each node v of T is labeled with a real number xv. Assume that the real numbers labeling the nodes are all distinct. A node v of T is a *local minimum* if the label xv is less than the label xw for all nodes w that are joined to v by an edge.

Given such a complete binary tree T, for each node v, the value xv is determined by *probing* the node v. Find a local minimum of T using only O(log *n) probes* to the nodes of T.  
  
b. Algorithm pseudo code  
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