WIA2005 Algorithm Design &Analysis
Semester 2, 2016/17
Lab 5

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1. Implement the RANDOMIZED-SELECT algorithm.

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RANDOMIZED-SELECT(A, p, r, i)
1  if p == r
2      return A[p]
3  q = RANDOMIZED-PARTITION(A, p, r)
4  k = q − p + 1
5  if i == k            // the pivot value is the answer
6      return A[q]
7  elseif i < k
8      return RANDOMIZED-SELECT(A, p, q − 1, i)
9  else return RANDOMIZED-SELECT(A, q + 1, r, i − k)
```

   Given an array A = (11, 4, 74, 55, 3, 17, 8, 46, 43, 33), find the following i^{th} element:
   a) Minimum
   b) Maximum
   c) i = 5
   d) i = 8
   e) Median (lower and upper)

2. Professor Olay is consulting for an oil company, which is planning a large pipeline running east to west through an oil field of *n* wells. The company wants to connect a spur pipeline from each well directly to the main pipeline along a shortest route (either north or south), as shown in Figure 5.1

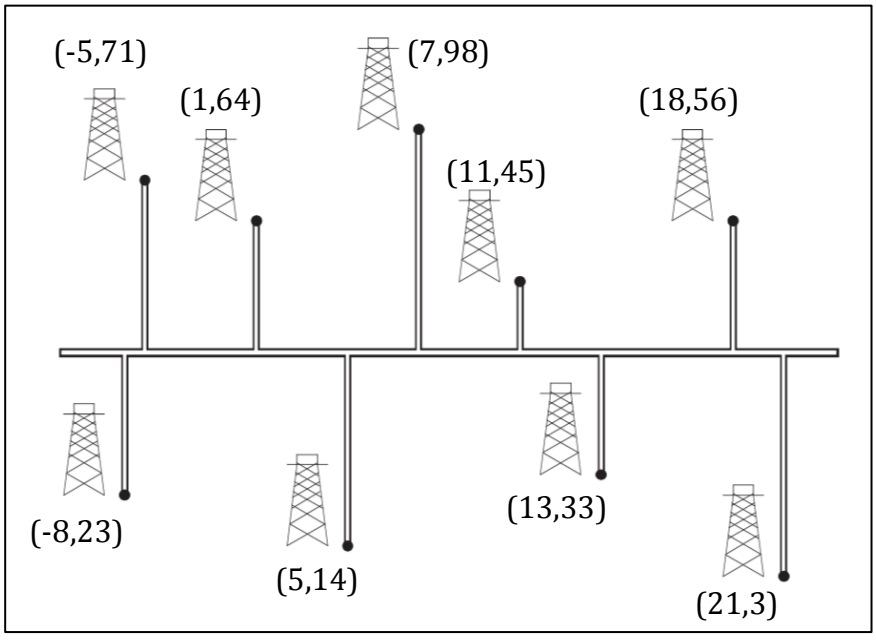

Figure 5.1

Create a program that records the x- and y-coordinates of the wells, and calculate the optimal location of the main pipeline, which would be the one that minimizes the total length of the spurs, in linear time.