

### EXERCISE FOR CSE202 – WEEK 3

**Question 1.** *You are interested in analyzing some hard-to-obtain data from two separate databases. Each database contains  $n$  numerical values—so there are  $2n$  values total—and you may assume that no two values are the same. You’d like to determine the median of this set of  $2n$  values, which we will define here to be the  $n$ th smallest value.*

*However, the only way you can access these values is through queries to the databases. In a single query, you can specify a value  $k$  to one of the two databases, and the chosen database will return the  $k$ th smallest value that it contains. Since queries are expensive, you would like to compute the median using as few queries as possible.*

*Give an algorithm that finds the median value using at most  $O(\log n)$  queries.*

**Question 2.** *Regarding the selection algorithm seen in class, what happens if we split the elements into  $n/3$  groups of size 3? Or  $n/k$  groups of size  $k$  for larger odd values of  $k$  ( $k > 5$ ) ? Derive asymptotic complexity bounds to justify your answer.*