

Lab 7

1. Show that any comparison-based algorithm to sort 4 elements requires at least 5 comparisons.
2. Devise an algorithm to sort 4 elements using exactly 5 comparisons.
3. Devise an algorithm that arranges the elements of a length- n integer array according to the following scheme:
 - position 0: the smallest integer
 - position 1: the largest integer
 - position 2: the second smallest integer
 - position 3: the second largest integer etc.For example, this algorithm would arrange the input array $\{1, 2, 17, -4, -6, 8\}$ as follows: $\{-6, 17, -4, 8, 1, 2\}$. (Notice that -6 is the smallest, 17 the largest, -4 second smallest, 8 second largest, etc.) What is the asymptotic running time of your algorithm? What is the fastest possible asymptotic running time for such an algorithm? Prove your answer.
4. Use RadixSort to sort the following: $\{80, 1, 46, 53, 28, 55, 32, 6, 9\}$, with radix = 9.