**Lab W2D2**

**Question 1: Radix Sort**

Let Radix be 9. Array to be sorted is {179, 721, 639, 549, 292, 427, 335, 435, 62}.

**Key % 9**

**0**  -> 549 -> 639 **1** -> 721 **2** -> 335

**3** -> 427 -> 435 **4** -> 292 **5** -> **6** -> **7** -> **8**  -> 62 -> 179

**(Key/9) %9**

**0** -> **1** -> 179 -> 335 **2** -> 427

**3** -> 435 **4** -> **5** -> 292 **6** -> 62 **7** -> 549 **8** -> 639 -> 721

**Key / 92**

**0** -> 62 **1** -> **2** -> 179

**3** -> 292 **4** -> 335 **5** -> 427 -> 435 **6** -> 549 **7** -> 639 **8** -> 721

**Sorted order** {62, 179, 292, 335, 427, 435, 549, 639, 721 }

**Question 2**

**Devise an algorithm to sort 4 elements using exactly 5 comparisons in the worst case. Does this violate the theoretical lower bound? Justify your answer.**

**Algorithm** sortFourElements(A)

**Input** sequence A of 4 elements

**Output** A in sorted order

max1,min1 = findMaxAndMin(A[0],A[1])

max2, min2 = findMaxAndMin(A[2],A[3])

last, mid1 = findMaxAndMin (max1,max2)

mid2, first = findMaxAndMin(min1,min2)

upperMid, lowerMid = findMaxAndMin(mid1, mid2)

return [first, lowerMid, upperMid, last]

The algorithm performs 5 comparisons which violates the theoretical lower bound of n(n-1)/2 = 6.

The **findMaxAndMin** function performs one comparison each time it is called.