**Exercise 9.1**

1. **Show that the second smallest of elements can be found with n+ lgn -2 comparisons in the worst case. (*Hint:* Also find the smallest element.)**

**Ans)**

Split the elements into pairs and get a winner from each pair based on the element that is smaller and repeat until we finally get the smallest element. This will take (n-1) comparisons in the worst case.

The second smallest element must have been in a pair with the smallest element. Number of comparisons that the smallest element had are log(n). We need to find the smallest element among these compared elements. This will be another log(n) -1 comparisons.

Totally,

n-1 + log(n) -1

* n + lgn -2

1. **Given n > 2 distinct numbers, you want to find a number that is neither the minimum nor the maximum. What is the smallest number of comparisons that you need to perform?**

**Ans)**

To find the minimum and maximum, comparisons needed: 3 ciel(n/2)

Next, we need at least 2 more comparisons to prove that the element being compared is neither the min nor the max.

Therefore, we need 2 + 3 ceil(n/2) comparisons.

1. **A racetrack can run races with five horses at a time to determine their relative speeds. For horses, it takes six races to determine the fastest horse, assuming transitivity (see page 1159). What’s the minimum number of races it takes to determine the fastest three horses out of 25?**

**Ans)**