1. **Suppose you used a binary search to search for all nine numbers.**

**(First, you search for 1, then 3, then 13, etc. until you have searched them all)**

**For each individual number, which other numbers would be examined?**

**1, 3, 13, 14, 17, 19, 22, 31, 39**

**For example: Searching for 1, you examine 17, 13, 3,  1**

**Answer:**

|  |  |
| --- | --- |
| **1** | **17,13,3,1** |
| **3** | **17,13,3** |
| **13** | **17,13** |
| **14** | **17,13,14** |
| **17** | **17** |
| **19** | **17,31,22,19** |
| **22** | **17,31,22** |
| **31** | **17,31** |
| **39** | **17,31,39** |

1. **Repeat problem 1 doing a linear search for each number. Which numbers would be examined for each individual number?**

**1, 3, 13, 14, 17, 19, 22, 31, 39**

**For example: Searching for 1, you examine:  1**

**For searching for 3, you examine 1 & 3.**

**Answer:**

|  |  |
| --- | --- |
| **1** | **1** |
| **3** | **1,3** |
| **13** | **1,3,13** |
| **14** | **1,3,13,14** |
| **17** | **1,3,13,14,17** |
| **19** | **1,3,13,14,17,19** |
| **22** | **1,3,13,14,17,19,22** |
| **31** | **1,3,13,14,17,19,22,31** |
| **39** | **1,3,13,14,17,19,22,31,39** |

1. **For each search, how many comparisons did it take to find each number? For example, the first number took 4 compares.**

**Answer**

|  |  |  |
| --- | --- | --- |
| **Numbers** | **No of comparisons Binary Search** | **No of comparisons Linear Search** |
| **1** | **4** | **1** |
| **3** | **3** | **2** |
| **13** | **2** | **3** |
| **14** | **3** | **4** |
| **17** | **1** | **5** |
| **19** | **4** | **6** |
| **22** | **3** | **7** |
| **31** | **2** | **8** |
| **39** | **3** | **9** |

1. **For the list in question 1, what is the maximum number of comparisons required to find any number using a serial search?**

Answer:

The maximum number of comparisons done using linear/serial search are 9 for searching 39 in the list.

1. **For the list in question 1, what is the maximum number of comparisons required to find any number using a binary search?**

Answer:

The maximum number of comparisons done using binary search are 4 for searching 1 and 19 in the list.