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For each number set below, you should “play the computer” to find the answers.

1. How many steps would it take to perform linear search for the value 3?  For the value 4?
2. How many steps would it take to perform binary search for the value 3? For the value 4? (you must sort the list first in order to do binary search)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Original List  (unsorted) | List  (Sorted) | Linear Search for 3 | Linear Search for 4 | Binary Search for 3 | Binary Search for 4 |
| 1 5 2 7 2 3 7 2 8 1 | 1 1 2 2 2 3 5 7 7 8 | 6 | 10 | 4 | 4 |
| 5 2 3 1 7 2 8 3 4 5 | 1 2 2 3 3 4 5 5 7 8 | 3 | 9 | 1 | 4 |
| 6 2 3 1 2 4 7 1 9 2 | 1 1 2 2 2 3 4 6 7 9 | 3 | 6 | 4 | 3 |
| 6 2 4 7 7 1 2 6 1 5 | 1 1 2 2 4 5 6 6 7 7 | 10 | 3 | 3 | 1 |

For one of the lists, perform selection sort.  Show each step as in the video.

Repeat step 1, using the sorted list.

|  |  |
| --- | --- |
| Stage 0: | 6 2 3 1 2 4 7 1 9 2 |
| Stage 1: | 6 2 3 1 2 4 7 1 9 2 |
| Stage 2: | **1** 2 3 6 2 4 7 1 9 2 |
| Stage 3: | **1 1** 3 6 2 4 7 2 9 2 |
| Stage 4: | **1 1 2** 6 3 4 7 2 9 2 |
| Stage 5: | **1 1 2 2** 3 4 7 6 9 2 |
| Stage 6: | **1 1 2 2 2** 4 7 6 9 3 |
| Stage 7: | **1 1 2 2 2 3** 7 6 9 4 |
| Stage 8: | **1 1 2 2 2 3 4** 6 9 7 |
| Stage 9: | **1 1 2 2 2 3 4 6** 9 7 |
| Stage 10: | **1 1 2 2 2 3 4 6 7** 9 |
| Stage 11: | **1 1 2 2 2 3 4 6 7 9** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sorted List | Linear Search for 3 | Linear Search for 4 | Binary Search for 3 | Binary Search for 4 |
| 1 1 2 2 2 3 4 6 7 9 | 6 | 7 | 4 | 3 |

Notes:

1 1 2 2 2 3 5 7 7 8

0 1 2 3 4 5 6 7 8 9

0,9.  0+9/2=4

4,9. 4+9/2=6

4,6   4+6/2=5

3

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1 2 2 3 3 4 5 5 7 8

0 1 2 3 4 5 6 7 8 9

0,9. 0+9/2=4

3

4,9. 4+9/2=6

4,6. 4+6/2=5

4

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1 1 2 2 2 3 4 6 7 9

0 1 2 3 4 5 6 7 8 9

0,9. 0+9/2=4

4,9. 4+9/2=6

4

4,6  4+6/2=5

3

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1 1 2 2 4 5 6 6 7 7

0 1 2 3 4 5 6 7 8 9

0,9. 0+9/2=4

4

0,4. 0+4/2=2

2