**Name:**

**Grade: /25**

**COSC 1435.001**

**Lab 3 Part 2**

Please use this document to submit your answers (Save As). Make sure you write your name in the designated space in this document.

1. Trace through the sequential search of an unordered list algorithm using the list given. Record your answers in the tables provided.

**Pseudocode for sequential search of an unordered list:**

|  |  |
| --- | --- |
| **Line #** | **Pseudocode Statement** |
| 1  2  3  4  5  6  7  8  9  10  11  12  13  14 | **function** sequentialSearch(a, arraySize, targetValue)  position 🡨 -1  index 🡨 0  **while** (index <arraySize AND position = -1)  **if** (a[index] = targetValue)  position = index  **end if**  index 🡨index + 1  **end while**  **if** (position = -1)  Print “Target not found”  **else**  Print “Found the target at index”, position  **end if** |

List to be searched:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Index** | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| **Element Value** | 6 | 34 | 32 | 12 | 51 | 24 | 42 | 65 | 76 |

Example:

Record tracing results for targetValue = 32

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **n** | **target** | **index** | **Line 4: While condition (true/false)** | **a[index]** | **Line 5: if condition**  **(a[index] = targetValue)**  **(true/false)** |
| 9 | -1 | 0 | True | 6 | False |
|  |  | 1 | True | 34 | False |
|  |  | 2 | True | 32 | **True** |
|  | **2** |  | False |  |  |
| Output message: Found the target at index 2  Number of key comparisons (if condition column) = 3 | | | | | |

1. Record tracing results for targetValue = 28 (5 points)

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Index** | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| **Element Value** | 19 | 30 | 8 | 43 | 28 | 34 | 25 | 15 | 73 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **n** | **target** | **index** | **Line 4: While condition (true/false)** | **a[index]** | **Line 5: if condition**  **(a[index] = targetValue)**  **(true/false)** |
| 9 | -1 | 0 | true | 19 | False |
|  |  | 1 | true | 30 | False |
|  |  | 2 | true | 8 | **False** |
|  |  | 3 | true | 43 | False |
|  |  | 4 | true | 28 | True |
|  | 4 |  |  |  |  |
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| Output message: Found the target at index 4  Number of key comparisons (if condition column) = 5 | | | | | |

1. Record tracing results for targetValue = 29 (5 points)

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Index** | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| **Element Value** | 16 | 43 | 23 | 21 | 15 | 42 | 24 | 56 | 67 |

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| --- | --- | --- | --- | --- | --- |
| **n** | **target** | **index** | **Line 4: While condition (true/false)** | **a[index]** | **Line 5: if condition**  **(a[index] = targetValue)**  **(true/false)** |
| 9 | -1 | 0 | true | 16 | False |
|  |  | 1 | True | 43 | False |
|  |  | 2 | True | 23 | False |
|  |  | 3 | True | 21 | False |
|  |  | 4 | True | 15 | False |
|  |  | 5 | True | 42 | False |
|  |  | 6 | True | 24 | False |
|  |  | 7 | True | 56 | False |
|  |  | 8 | True | 67 | False |
|  |  |  |  |  |  |
| Output message: Target Not Found  Number of key comparisons (if condition column) = 9 | | | | | |

1. Record tracing results for targetValue = 13 (5 points)

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Index** | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| **Element Value** | 13 | 34 | 32 | 12 | 51 | 24 | 42 | 65 | 76 |

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| --- | --- | --- | --- | --- | --- |
| **n** | **target** | **index** | **Line 4: While condition (true/false)** | **a[index]** | **Line 5: if condition**  **(a[index] = targetValue)**  **(true/false)** |
| 9 | -1 | 0 | True | 13 | True |
|  | 0 |  |  |  |  |
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| Output message: Found the target at index 0  Number of key comparisons (if condition column) = 1 | | | | | |

1. Trace through the binary search algorithm using the list given. Record your answers in the tables provided.

**Pseudocode for Binary Search:**

|  |  |
| --- | --- |
| **Line #** | **Pseudocode Statement** |
| 1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16  17  18  19 | **function** binarySearch(a, arraySize, targetValue)  position 🡨 -1  first🡨0  last🡨arraySize-1  **while** (last ≥ first AND position = -1)  mid 🡨⎣ (first+last) / 2⎦  **if** (a[mid] = Target)  position 🡨 mid  **else if** (a[mid] > Target)  last 🡨 mid-1  **else if** (a[mid] < Target)  first 🡨 mid+1  **end if**  **end while**  **if** (position = -1)  Print “Target not found”  **else**  Print “Found the target at index”, position  **end if** |

List to be searched:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Index** | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| **Element Value** | 6 | 12 | 24 | 32 | 34 | 42 | 51 | 65 | 76 | 89 |

Example:

Record tracing results for Target = 32

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **n** | **index** | **first** | **last** | **Line 5: while (true/false)** | **mid** | **a[mid]** | **Line 7:**  **a[mid]=Target?** | **Line 9:**  **a[mid]>Target?** | **Line 11:**  **a[mid]<Target?** |
| 10 | -1 | 0 | 9 | True | 4 | 34 |  | True |  |
|  |  |  | 3 | True | 1 | 12 |  |  | True |
|  |  | 2 |  | True | 2 | 24 |  |  | True |
|  |  | 3 |  | True | 3 | 32 | True |  |  |
|  | 3 |  |  | False |  |  |  |  |  |
| Output message: Found the target at index 3  Number of key comparisons = 4 | | | | | | | | | |

1. Record tracing results for Target = 23 (5 points)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Index** | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| **Element Value** | 3 | 11 | 13 | 21 | 23 | 42 | 51 | 65 | 76 | 89 |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **n** | **index** | **first** | **last** | **Line 5: while (true/false)** | **mid** | **a[mid]** | **Line 7:**  **a[mid]=Target?** | **Line 9:**  **a[mid]>Target?** | **Line 11:**  **a[mid]<Target?** |
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|  |  |  |  |  |  |  |  |  |  |
| Output message:  Number of key comparisons (line 11) = | | | | | | | | | |

1. Record tracing results for Target = 94 (5 points)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Index** | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| **Element Value** | 3 | 11 | 13 | 21 | 24 | 39 | 50 | 67 | 83 | 94 |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **n** | **index** | **first** | **last** | **Line 5: while (true/false)** | **mid** | **a[mid]** | **Line 7:**  **a[mid]=Target?** | **Line 9:**  **a[mid]>Target?** | **Line 11:**  **a[mid]<Target?** |
|  |  |  |  |  |  |  |  |  |  |
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| Output message:  Number of key comparisons (line 11) = | | | | | | | | | |