|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
| H / T |  |  |  |  |  |

Enqueue: Add element to the tail, and move the tail back

Dequeue: Move the head back, and remove the element

Enqueue(4)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 4 |  |  |  |  |  |
| H | T |  |  |  |  |

Enqueue(1)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 4 | 1 |  |  |  |  |
| H |  | T |  |  |  |

Enqueue(3)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 4 | 1 | 3 |  |  |  |
| H |  |  | T |  |  |

Dequeue()

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 1 | 3 |  |  |  |
|  | H |  | T |  |  |

Enqueue(8)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 1 | 3 | 8 |  |  |
|  | H |  |  | T |  |

Dequeue()

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | 3 | 8 |  |  |
|  |  | H |  | T |  |

Question 2:

Perform binary search (by hand) on the following array:

**[3, 14, 27, 31, 39, 42, 55, 70, 74, 81, 85, 93, 98]**

**Key = 55**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3 | 14 | 27 | 31 | 39 | 42 | 55 | 70 | 74 | 81 | 85 | 93 | 98 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |

First iteration:

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3 | 14 | 27 | 31 | 39 | 42 | 55 | 70 | 74 | 81 | 85 | 93 | 98 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |

Calculate

Compare against

return

Took 1 iteration or 1 execution of the outermost **if** statement.

**Key = 70**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3 | 14 | 27 | 31 | 39 | 42 | 55 | 70 | 74 | 81 | 85 | 93 | 98 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |

First iteration:

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **3** | **14** | **27** | **31** | **39** | **42** | **55** | **70** | **74** | **81** | **85** | **93** | **98** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |

Calculate

Compare against

do:

Second iteration:

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3 | 14 | 27 | 31 | 39 | 42 | 55 | **70** | **74** | **81** | **85** | **93** | **98** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |

Calculate

Compare against

do:

Third iteration:

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3 | 14 | 27 | 31 | 39 | 42 | 55 | **70** | **74** | 81 | 85 | 93 | 98 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |

Calculate

Compare against

return

Took 3 iterations or 3 executions of the outermost **if** statement.

**Key = 72**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3 | 14 | 27 | 31 | 39 | 42 | 55 | 70 | 74 | 81 | 85 | 93 | 98 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |

**First iteration:**

Second iteration:

Third iteration:

Fourth iteration:

After:

Terminate while loop. Return -1

**Key = 14**

**2b: iii, reduced to**

**Big-O Class: O(log(n))**