**Binary Search By Hand**

This exercise follows the same pattern as the last one, except that here you'll be doing a binary search, rather than a linear search.

Starting with the array pictured below, fill out the variables below it, step by step, in order to show how a binary search operates. The first couple of steps are filled in, as a demonstration

Given the method (defined with the SearchingAndSorting class)

**bool FindIntegerBinary(int targetValue, int[] arrayToSearch)**

This method will be called from main, in the following manner:

int [] nums = { 0, 3, 5, 7, 12, 17, 21, 23, 27, 37, 57, 101, 102, 105, 200, 203};

SearchingAndSorting sas = new SearchingAndSorting();

if( sas.FindIntegerBinary(17, nums) )

Console.WriteLine("Found it!");

You will start your 'trace' as follows:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Array Index: | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Value: | 0 | 3 | 5 | 7 | 12 | 17 | 21 | 23 | 27 | 37 | 57 | 101 | 102 | 105 | 200 | 203 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  | | --- | --- | | Iteration 0 | | | Target Value: | 17 | | Max Index: | 15 | | Min Index: | 0 | | Index ½ in between | 7 | | Value Found at that middle index?  ( 23 != 17 ) | False | | Next iteration, change \_**Max**\_\_\_ to: | 6 | | |  |  | | --- | --- | | Iteration 1 | | | Target Value: | 17 | | Max Index: | 6 | | Min Index: | 0 | | Index ½ in between | 3 | | Value Found at that middle index?  ( 7 != 17 ) | FALSE | | Next iteration, change \_\_\_MIN\_\_\_ to: | 4 | |
| |  |  | | --- | --- | | Iteration 2 | | | Target Value: | 17 | | Max Index: | 6 | | Min Index: | 4 | | Index ½ in between | 5 | | Value Found at that middle index?  ( 17 == 17 ) | TRUE | | Next iteration, change \_\_\_XXX\_\_\_ to: | XXX | | |  |  | | --- | --- | | Iteration 3 | | | Target Value: |  | | Max Index: |  | | Min Index: |  | | Index ½ in between |  | | Value Found at that middle index?  ( ) |  | | Next iteration, change \_\_\_\_\_\_ to: |  | |
| |  |  | | --- | --- | | Iteration 4 | | | Target Value: |  | | Max Index: |  | | Min Index: |  | | Index ½ in between |  | | Value Found at that middle index?  ( ) |  | | Next iteration, change \_\_\_\_\_\_\_ to: |  | | |  |  | | --- | --- | | Iteration 5 | | | Target Value: |  | | Max Index: |  | | Min Index: |  | | Index ½ in between |  | | Value Found at that middle index?  ( ) |  | | Next iteration, change \_\_\_\_\_\_ to: |  | |