BINARY SEARCH ALGORITHM

This is a search algorithm.
It takes advantage of a collection of elements that is already sorted.
It ignores half of the elements in the first comparison making it easier to search in the other remaining half

HINT: Use if-elif-else loop within the while loop

LOGIC:

1. Let there be a number ‘x’
2. Compare x with the middle element of the list.
3. If x matches with the middle element, return the mid index.
4. If x is greater than the mid element, then x will lie on the right side of the middle element.
5. Apply the same algorithm again for the right half to compare with the middle element of the right side.
6. If x is smaller than the middle element, then x will lie on the left hand side of the middle element. We apply the same algorithm for the left half in this case.

ALGORITHM

1. Define a function which takes a list and the target number (x) as input parameters
2. Initialize 2 variables, ‘low’ and ‘high’ that represent the lower and upper bounds of the search range
3. Create a while loop that finds the index of the middle element. It should also compare this middle value with the target number (x)
   HINT: while low <= high: → (explain the reason in a comment in your notebook)
4. Create an ‘if loop’ within the ‘while loop’ to compare the number with the mid value
   a. If middle value = x, return this index
   b. If x < middle value, then search the left half
      HINT: change the value of variable ‘high’ set earlier to now hold value of (mid - 1)
   c. If x > middle value, then search the right half
      HINT: change the value of variable ‘low’ set earlier to now hold value of mid+1
      These ‘if’ loops should be within the ‘while loop’ so that the target number is kept comparing with the middle value each time until the number is matched

5. If target number is not found within the list, then return -1
6. Now call the above function, pass a random list of numbers along with a random target number of your choice
7. Using the ‘if’ loop:
   a. if the number is present in the list, print “Target found at index [index number]’
   b. If number not present in the list, print “Target not found in the list”