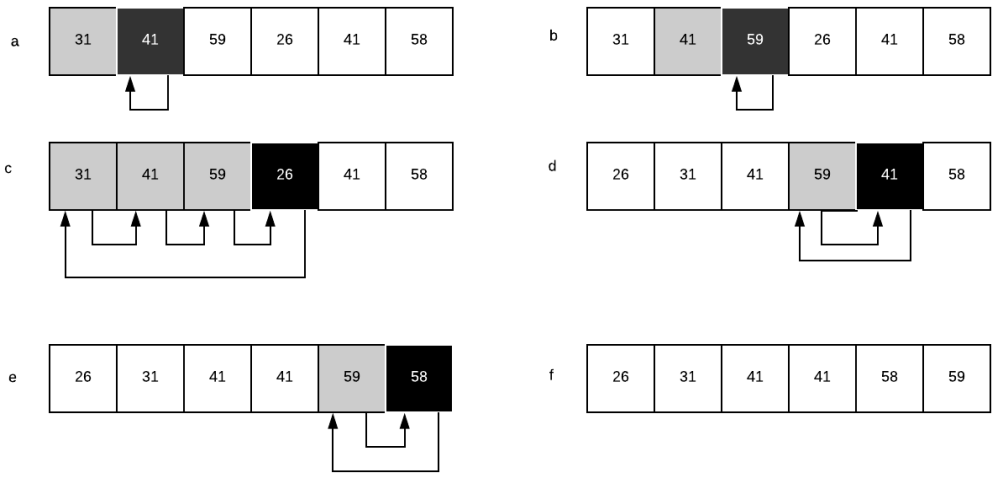
1 Ejercicio 2.1-1

Using Figure 2.2 as a model, illustrate the operation of INSERTION-SORT on the array A= 31,41,59,26,41,58.



2 Ejercicio 2.1-2

Rewrite the INSERTION-SORT procedure to sort into nonincreasing instead of nondecreasing order.

```
import math
import numpy as np

def insertion_sort(A):
j = 1
while j < len(A):
    key = A[j]
    i = j - 1
    while (i >= 0) and (A[i] < key):
        A[i + 1] = A[i]
        i = i - 1
    A[i + 1] = key
    j = j + 1
    B = [5, 4, 6, 3, 7, 2, 8, 1, 9]
    print B
    insertion_sort(B)
```

```
print B

[5, 4, 6, 3, 7, 2, 8, 1, 9]
[9, 8, 7, 6, 5, 4, 3, 2, 1]
```

3 Ejercicio 2.1-3

Consider the searching problem:
Input: A sequence of n numbers A=a1,a2,...,an and a value v.
Output: An index i such that v=Ai or the special value NIL if v does not appear in A.
Write pseudocode for linear search, which scans through the sequence, looking for v. Using a loop invariant, prove that your algorithm is correct. Make sure that your loop invariant fulfills the three necessary properties.

```
i=1
for i to A.length
    if A[i]== v
        return i
return NIL
```

4 Ejercicio 2.1-3

Consider the problem of adding two n-bit binary integers, stored in two n-element arrays A and B. The sum of the two integers should be stored in binary form in an (n+1)-element array C. State the problem formally and write pseudocode for adding the two integers.

```
n = A.length
i=1
for i to n+1
    C[i] = 0

s = 0
i = n
for i to 1
    C[i] = (A[i] + B[i] + s) % 2
    s = (A[i] + B[i] + s) / 2

C[i] = s
```