

Exercise 1

1. Run INSERTION-SORT on the following inputs and write down a trace of the execution in the style of CLRS Figure 2.2 (page 20 in 4th edition).
 - (7, 2, 1, 4)
 - (8, 5, 3, 1)
 - ('a', 'm', 'f', 'b')

– NB: How do you compare characters?

Exercise 2

Consider the pseudo-code for $\text{SUM}(A, n)$:

$\text{SUM}(A, n)$

```
1   $i = 0$ 
2   $sum = 0$ 
3  while  $i \leq n$ 
4       $sum = sum + A[i]$ 
5  return  $sum$ 
```

1. Prove with a loop invariant that the algorithm correctly sums the elements in the array passed to it. Note that:
 - A is an array of real numbers (index starting from 0)
 - n is the size of A (so n is an integer such that $n \geq 0$)

Exercise 3

1. Rewrite the INSERTION-SORT procedure to sort into monotonically decreasing order instead of monotonically increasing order (this is exercise 2.1-3 from CLRS).