ICCS208: Assignment 4

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1: Mathematical Proof

Mathematically, what is the running time of the code presented in the puzzle at the beginning of class? We can talk about both worst-case running time and best-case running time. The worst-case running on input of size n is the running time of the hardest input of that size —i.e., one that takes the longest to run. The best-case running time on input of size n is the running time of the easiest input of that size. Your task here is to determine the best-case running time, as well as the worst-case running time, as a function of the input size (the length of the input sequence)?

The ”puzzle” in question is the following Python method:

```python
from copy import copy
def foobar(numbers: List[int]) -> List[int]:
    # make a copy of numbers
    numbers = copy(list(numbers))
    for j in range(1, len(numbers)):
        key = numbers[j]
        i = j-1
        while i >= 0 and numbers[i] > key:
            numbers[i+1] = numbers[i]
            i = i-1
        numbers[i+1] = key
    return numbers
```