CSCI 305 HW 1

Isaac Boaz

October 3, 2023

Do a detailed analysis for each of the following code snippets. Give the runtime in a big-O notation.

Problem 1

```
1   sum = 0                          1
2       for i = 1 to n               n + 1
3           for j = 1 to n           n + 1
4               sum++                n²
5   return sum                       1
```

$$[C_1 \cdot 1] + [C_2 \cdot (n + 1)] + [C_3 \cdot (n + 1)] + [C_4 \cdot \mathbf{n^2}] + [C_5 \cdot 1]$$
$$\implies O(n^2)$$

Problem 2

```
1   sum = 0                          1
2       for i = 1 to n               n + 1
3           for j = 1 to i           Σ_{j=1}^{i+1} j
4               sum++                Σ_{j=1}^{i} j
5   return sum                       1
```

$$[C_1 \cdot 1] + [C_2 \cdot (n + 1)] + [C_3 \cdot \sum_{j=1}^{i+1} j] + [C_4 \cdot \sum_{j=1}^{i} j] + [C_5 \cdot 1]$$
$$= [C_1 \cdot 1] + [C_2 \cdot (n + 1)] + [C_3 \cdot \frac{\mathbf{(n + 1)(n + 2)}}{2}] + [C_4 \cdot \frac{n(n + 1)}{2}] + [C_5 \cdot 1]$$
$$\implies O(n^2)$$