Assignment Solutions Xavier

Problem 1: Big O Analysis

Following the code that was put up here is a step by step analysis of it

Step-by-step analysis:
1. The outer loop runs while iterate1 < sz – 1, so it runs approximately n times.
2. The inner loop (iterate2) increments up to n for each value of iterate1.
3. This results in roughly n × n = n^2 total iterations.
4. Inside the loop, multiplication and comparison are O(1) operations.

Therefore, the time complexity is $O(n^2)$. The space complexity is O(1) since only a few variables are used.

Problem 2: M&Ms Bag Puzzle

As mentioned before, We are given 20 bags of M&Ms:
- 19 bags contain pieces weighing 1.0 gram each.
- 1 bag contains pieces weighing 1.1 grams each.
We can only use the scale once to find the heavy bag.

Solution:
1. Label the bags from 1 to 20.
2. Take 1 candy from bag 1, 2 candies from bag 2, 3 candies from bag 3, and so on until 20 candies from bag 20.
3. Weigh all the candies together once.

If all candies weighed 1.0 g, the total weight would be the sum of 1+2+...+20 = 210 g.
If bag k is the heavy bag, the total weight will be 210 + 0.1 × k grams.

By checking how much the total weight exceeds 210 g, we can identify the heavy bag. For example, if the total weight is 210.3 g, bag 3 is heavy; if it is 210.17 g, then bag 17 is heavy.