[CSIE] Data Structures: Homework 2022

Scope: CH 1

Note that this homework does not need to be handed in, and no score is calculated. Some of these questions may appear in the mid-term exam.

1. What is the time complexity of the following code fragment?

```
for (int i = 0; i < 10; i++){
    for (int j = 0; j < N; j++){
        for (int k = N - 2; k < N + 2; k++){
            print("%d %d", i, j);
        }
    }
}
```

   (a) $O(\log N)$
   (b) $O(N \log N)$
   (c) $O(N)$
   (d) $O(N^2)$
   (e) $O(N^3)$

2. Please determine whether the following is correct for the little o notation, answer True or False.
   (a) $n = O(8n)$
   (b) $2^n = O(n^3)$
   (c) $1 = O(n^2)$
   (d) $n = O(\log n)$
   (e) $1 = O(\frac{1}{n})$

3. Please determine whether the following is correct, answer True or False.
   (a) $5n^2 - 6n = \Theta(n^2)$
   (b) $n! = O(n^n)$
   (c) $2n^2 + n \log n = \Theta(n^2)$
   (d) $10n^2 + 9 = O(n)$
   (e) $3n^n = O(2^n)$

4. Compare the various values of n in two polynomials n^2 and $20n + 4$. When will the second function become smaller than the first?