Homework Big O notation

- 1. Determine the big-O for each of the following functions.
 - a. f(n) = 100 O(1)
 - b. $f(n) = 7n 13 \, \mathcal{O}(n)$
 - c. $f(n) = n^2 + n^2 \log(n) + n! \mathcal{O}(n!)$

 - d. $f(n) = n^4 + 3^n O(n^3)$ e. $f(n) = 5n^3 + 3n \log(n) O(\log n)$ f. $f(n) = n^5 + n^3 n! + 4n 1 O(n!)$ g. $f(n) = (n2^n + 3n^5)(2n^7 + 2\log(n)) O(\log n)$
- 2. Determine T(n) relationship between processing time and n. Then determine a big-O estimate for the number of operations (a Simple Statement takes one unit of time) used in this segment of an algorithm.

for(int i = 0; in-1

$$3=0... J=n$$
-1

 $1=0... J=n$ -1

$$j=0...J=n-1$$
 $j=0...J=n-1$
 $j=0...J=n-1$
 $j=0...J=n-1$
 $j=0...J=n-1$
 $j=0...J=n-1$
 $j=0...J=n-1$

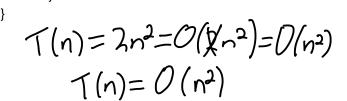
Simple Statement Simple Statement Simple Statement Simple Statement

}

$$\int (n) = n^2 + 4n + 5 = D(n^2)$$

3. Determine T(n) relationship between processing time and n. Then determine a big-O estimate for the number of operations (a Simple Statement takes one unit of time) used in this segment of an algorithm.

$$\begin{aligned}
& (i++) \\ &= i; j < n; j + +) \\ &= i; j < n; j + +) \\ &= i; j < n; j + +) \\ &= i; j < n; j + +) \\ &= i; j < n; j + +) \\ &= i; j < n; j + +) \\ &= i; j < n; j + +) \\ &= i; j < n; j + +) \\ &= i; j < n; j + +) \\ &= i; j < n; j + +) \\ &= i; j < n; j + +) \\ &= i; j < n; j + +) \\ &= i; j < n; j + +) \\ &= i; j < n; j + +) \\ &= i; j < n; j + +) \\ &= i; j < n; j + +) \\ &= i; j < n; j + +) \\ &= i; j < n; j + +) \\ &= i; j < n; j + +) \\ &= i; j < n; j + +) \\ &= i; j < n; j + +) \\ &= i; j < n; j + +) \\ &= i; j < n; j + +) \\ &= i; j < n; j + +) \\ &= i; j < n; j + +) \\ &= i; j < n; j + +) \\ &= i; j < n; j + +) \\ &= i; j < n; j + +) \\ &= i; j < n; j$$



4. Determine T(n) relationship between processing time and n. Then determine a big-O estimate for the number of operations (a Simple Statement takes one unit of time) used in this segment of an algorithm.

```
i=0... i=n-1
 for(int i = 0; i < n; i++){
                                       J=0...J=n-1
        for(int j = 0; j < n; j++){
                                        K50... K=1-1
               for(int k = 0; k < n; k++){
                                        は わころり
                     Simple Statement
                     Simple Statement
              }
        }
 }
                              1=0... 1=n-1

2=0... 5=n-1

+4=4.0
 for(int i = 0; i<n; i++){
        for(int j = 0; j < n; j++){
               Simple Statement
               Simple Statement
               Simple Statement
               Simple Statement
        }
 }
                                i=0... i=n+2
 for(int i = 0; i < n; i = i + 2){
                                ts +5=5.7
               Simple Statement
               Simple Statement
               Simple Statement
               Simple Statement
               Simple Statement
 }
 Simple Statement
 Simple Statement
Simple Statement 73 + 4n2 + \frac{5n}{2} + 3 = O(n3)
```

5. Find C, n_0 , f(n) such that $|T(n)| \leq C|f(n)|$ whenever $n > n_0$.

a. $T(n) = n^3 - 5n^2 + 20n - 10$

6. Find C, n_0 , f(n) such that $|T(n)| \leq C|f(n)|$ whenever $n > n_0$.

a. $T(n) = 2n^2 + 3n - 4$

7. Find $C, n_0, f(n)$ such that $|T(n)| \leq C|f(n)|$ whenever $n > n_0$.

a. $T(n) = 2^n + 4n^2 + 3$

C Z9

8. Find C, n_0 , f(n) such that $|T(n)| \leq C|f(n)|$ whenever $n > n_0$.

a. $T(n) = n^2 + 10n + 10$

9. Find $C, n_0, f(n)$ such that $|T(n)| \leq C|f(n)|$ whenever $n > n_0$.

a. $T(n) = n^3 + n^2 + n - 1$

10. Find $C, n_0, f(n)$ such that $|T(n)| \le C|f(n)|$ whenever $n > n_0$.

a. T(n) = 20n - 10

C >10

5. N3-5n2+201-104CM3 13-8-12+20-1-106 C-13 -4+20-10CC

2.12+3.1-466

7. 2nt4n2+3 LCn2 2.1+4.12+3 CC-12 2+4+3 CC QLC

8. N2+10n+10 L CN2 12+10-1+10 L C.P2 1+104066 2126

9. N3+12+1-12C·13/10, 20n-102Cn 13+12+1-12C·13/20-102Cn

20-10L C 1046