CS310 Data Structures and Algorithms Spring 2020

Extra Credit Assignment #2

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1. What is the tightest bound Big O for the following: (10 Points)

   a) $f(N) = (1/2)(N \log N) + (\log N)^2$

   _____(log N)^2_____

   b) $f(N) = N^2 * (N + N \log N + 1000)$

   _____N^3 log N_____

   c) $f(N) = N^2 \log N + 2^N$

   _____2^N_____

   d) $f(N) = ((1/2)(3N + 5 + N))^4$

   _____N^4_____

   e) $f(N) = (2N + 5 + N^4)/N$

   _____N^3_____

   f) $f(N) = \log_{10}(2^N)$

   _____N_____

   g) $f(N) = N! + 2N$

   _____N!_____

   h) $f(N) = (N * N * N * N + 2N)^2$

   _____N^8_____

   i) $f(N) = N^{\frac{1}{2}} + \log N$

   _____N^(1/2)_____

   j) $f(N) = N \log(100^3)$

   _____N_____

2. Give the tightest bound in terms of Big O, of the following code snippets(10 Points)

a. ```
public type something(n){

      result = 0;

      while (n > 1){

            n /= 2;

            result += 1;

      }

      return result;

   }
```
   O(Log N)


b. ```
public type something(n, a[]){

      for (i=0, i<n; i++){

            if (a[i] == 0)

                  return 0;

      }

      return 1;

   }
```
   O(N)

```
c. public type something(n){

        result = 0;

        for (i=0, i<n; i++){

                for (int j=i; j<n;j++){

                        result += 1;

                }

        }

        return result;

    }
```

O(N^2)

```
d. int count =0;

   for(int i=n;i>0;i/=2)

        for(int j=0;j<i;j++)

                count++;
```

O(LOG N)

```
e. void silly(int n)

    {

        for (int i = 0; i < n * n; ++i) {

                for (int j = 0; j < n; ++j) {

                        for (int k = 0; k < i; ++k)

                                System.out.println("k = " + k);

                        for (int m = 0; m < 100; ++m)

                                System.out.println("m = " + m);

                }

        }

    }
```

O(N^5)