CS 324 Intro to Design of Algorithm
Practice 1   Fall 2017

The "category" choices for all problems are:

(A) $\theta(1)$ (B) $\theta(\log n)$ (C) $\theta((\log n)^2)$ (D) $\theta(n)$ (E) $\theta(n\log n)$ (F) $\theta(n(\log n)^2)$
(G) $\theta(n^2)$ (H) $\theta(n^2\log n)$ (I) $\theta(n^2(\log n)^2)$ (J) $\theta(n^3)$ (K) $\theta(n^3\log n)$

Question 1 Let $T(n)$ be the number of lines of output when the following function is called with an array of size n. Give the exact formula for $T(n)$ in terms of n. Which category does (n) belong to?

```
void myFun1(int [] A, int n) {

   for (int i = 1; i <= n; i++)

      for (int j = 1; j <= n; j++)

         for (int k = 1; k <= n; k++)

            System.out.println(A[i] + ", " + A[j] + ", " + A[k])

}
```

Question 2 Let $T(n)$ be the number of lines of output when the following function is called. Give the exact formula for (n) in terms of n. Which category does (n) belong to?

```
void myFun(int n) {

   for (int i = 1; i <= n / 4; i++) {

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

       for (int k = 1; k <= i; k++)

          System.out.println(k);

   }
}
```

Question 3 Let $T(n)$ be the number of lines of output when the following function is called with an array of size n.

```
void myFun3(int [] A, int n) {

    int i, k, count, m = 0;

    for (i = 1; i <= n - 1; i++) {

        k = i + 1;

        count = 1;

        while (k <= n && A[k] == A[i]) {

            count++;

            k++;

        }

        if (count > m)

            m = count;

    }

}
```

a) What is the category of the best case running time of "myFun3" (i.e., the fastest it finishes)?

b) What is the category of the worst case running time of "myFun3"?