

CMSC 132 BIG-O Exercise

1. List the following big-O expressions in order of asymptotic complexity (with the lowest complexity first).

$O(n \log(n))$ $O(n!)$ $O(\log(n))$ $O(2^n)$ $O(n^2)$

2. For each of the following code snippets, identify the critical section(s), compute the time ($T(n)$) each one takes, and specify the asymptotic complexity using Big-O. **Circle the area(s) you consider critical section(s).**

- ----- Example -----

```
for(int k=0; k < n; k += 3) {
    for (int p=n; p > 6; p--) {
        System.out.println(p % 2); // critical section
    }
}
```

$T(n) = (n/3) * (n-6) = n^2/3 - 2n$
Big-O = $O(n^2)$

- a. -----

```
for(int k=0; k <=n/8; k++) {
    System.out.println(k);
}
System.out.println("Next");
for (int p=n; p>= 1; p--) {
    System.out.println(p % 2);
}
```

$T(n) =$

Big-O = $O(\quad)$

- b. -----

```
for(int k=0; k < n-1; k++) {
    for (int m=k+1; m < n; m++) {
        System.out.println(k*m);
    }
}
```

$T(n) =$

Big-O = $O(\quad)$

c. -----

```
for (int i=n-3; i<=n-1; i++) {
    System.out.println(i);
    for (int k=1; k<=n; k++) {
        System.out.println(i + k);
    }
}
```

T(n) =

Big-O = O ()

d. -----

```
for(int a=1; a <= n/3; a++) {
    for (int b=1; b <= 2*n; b++) {
        System.out.println(a * b);
    }
}
```

T(n) =

Big-O = O ()

e. -----

```
for (int i=0; i<n-3; i++) {
    for (int k=1; k<n; k*=10) {
        System.out.println(i + k);
    }
}
```

T(n) =

Big-O = O ()

f. -----

```
for(int k=3; k <=n; k++) {
    System.out.println(k);
}
System.out.println("Next");
for (int p=n; p>= 1; p--) {
    for (int a=n-3; a<=n-2; a++) {
        System.out.println(p*a);
    }
}
```

T(n) =

Big-O = O ()