

big-O Exercises.

I) Write out the big-O orderings of the following functions from slowest to fastest growing:

ORDERING	FUNCTION
	1.0001^n
	$10000 * \lg(n)$
	$15 * n^5 - 3 * n^3 + 13 * n$
	10^{50}
	$n!$
	$100 * n * \lg(n)$
	$\lg(\lg(n))$
	$20 * n^2$
	$0.2 * n^3$
	$\text{sqrt}(n)$
	$\text{sqrt}(n^5)$
	$0.00001 * n$
	$\lg^5(n)$
14	n^n

II) Let $\text{Body1} = O(1)$; $\text{Body2} = O(\lg(N))$; $\text{Body3} = O(N)$.

What is big $O(f(N))$ for the following sets of statements?

1) $O(\underline{\hspace{2cm}})$

```
{  
    Body1;  
    Body2;  
    Body3;  
}
```

2) $O(\underline{\hspace{2cm}})$

```
for (i = 1; i <= 10000; i++) { Body1; Body2; Body3; }
```

3) $O(\underline{\hspace{2cm}})$

```
for (i = 1; i <= N; i++) { Body1; Body2; Body3; }
```

4) $O(\underline{\hspace{2cm}})$

```
for (i = 1; i <= N/10000; i++) { Body1; Body2; Body3; }
```

5) $O(\underline{\hspace{2cm}})$

```
for (i = 1; i <= N; i+=10000) { Body1; Body2; Body3; }
```

6) $O(\underline{\hspace{2cm}})$

```
for (i = N; i >= 1; i--) { Body1; Body2; Body3; }
```

7) $O(\underline{\hspace{2cm}})$

```
for (i = 1; i <= N; i*=10000) { Body1; Body2; Body3; }
```

8) $O(\underline{\hspace{2cm}})$

```
for (i = 1; i <= N; i++) Body1;  
    for (j = 1; j <= N; j++) Body2;  
        for (k = 1; k <= N; k++) Body3;
```

9) $O(\text{_____})$

```
for (i = 1; i <= N; i++)
    for (j = 1; j <= N; j++)
        for (k = 1; k <= N; k++)
            { Body1; Body2; Body3; }
```

10) $O(\text{_____})$

```
for (i = 1; i <= N; i++)
    for (j = 1; j <= i; j++)
        for (k = 1; k <= j; k++)
            { Body1; Body2; Body3; }
```

11) $O(\text{_____})$

```
for (i = 1; i <= N; i*=2)
    for (j = 1; j <= N; j*=2)
        for (k = 1; k <= N; k*=2)
            { Body1; Body2; Body3; }
```

12) $O(\text{_____})$

```
for (i = 1; i <= N; i++)
    for (j = 1; j <= N; j*=2)
        for (k = N; k >= 1; k/=2)
            for (m = N; m >= 1; m--)
                { Body1; Body2; Body3; }
```