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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* |
|  | 1050 |
|  | *n*! |
|  | 100 \* *n* \* lg(*n*) |
|  | lg(lg(*n*)) |
|  | 20 \* *n*2 |
|  | 0.2 \* *n*3 |
|  | sqrt(*n*) |
|  | sqrt(*n*5) |
|  | 0.00001 \* *n* |
|  | lg5(*n*) |
| 14 | *nn* |

II) Let Body1 = O(1); Body2 = O(lg(*N*)); Body3 = O(*N*).

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

1) O(\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

{

Body1;

Body2;

Body3;

}

2) O(\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

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

3) O(\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

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

4) O(\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

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

5) O(\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

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

6) O(\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

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

7) O(\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

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

8) O(\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

for (i = 1; i <= N; i++) Body1;

for (j = 1; j <= N; j++) Body2;

for (k = 1; k <= N; k++) Body3;

9) O(\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

for (i = 1; i <= N; i++)

for (j = 1; j <= N; j++)

for (k = 1; k <= N; k++)

{ Body1; Body2; Body3; }

10) O(\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

for (i = 1; i <= N; i++)

for (j = 1; j <= i; j++)

for (k = 1; k <= j; k++)

{ Body1; Body2; Body3; }

11) O(\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

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(\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

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; k--)

{ Body1; Body2; Body3;}