

Homework+n² times

1. `for (int i=1; i<=n; i++)`
 `cout << "Coder Army";`
 $\Rightarrow \Omega(n^2), O(n^2), \Theta(n^2)$

2. `for (int i=1; i<=n*n; i=i+2)`
 `cout << "Coder Army";`
 \Rightarrow

$i=1$	$i=3$	$i=5$	\dots	$i=n^2$
1	1	1		1

 $\Rightarrow O(n^2), O(n^2), \Omega(n^2)$

3. `for (int i=1; i<=n; i++)`
 `for (int j=1; j<=n; j=j+5)`
 `cout << " ";`

$i=1$ $j=1 \text{ to } n$ $\frac{n}{5}$	$i=2$ $j=6 \text{ to } n$ $n-6$	$i=3$ $j=11 \text{ to } n$ $n-11$	\dots	$i=n$ $j=n/5+1 \text{ to } n$ $(n - (\frac{n}{5} + 1))$
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$\Rightarrow n + n-6 + n-11 + \dots + \frac{n}{5}$

\Rightarrow

$i=1$ $j=1 \text{ to } n$ $n/5$	$i=2$ $j=1 \text{ to } n$ $n/5$	\dots	$i=n$ $j=1 \text{ to } n$ $n/5$
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 $\Rightarrow \frac{n}{5} + \frac{n}{5} + \frac{n}{5} + \dots + \frac{n}{5} = n \left[\frac{1}{5} + \frac{1}{5} + \dots + \frac{1}{5} \right]$
 $\Rightarrow n \times \frac{n}{5} = \frac{n^2}{5}$

\Rightarrow So, $O(n^2/5)$, $\Omega(n^2), \Theta(n^2)$

4. $\text{for (int } i = 1; i \leq n; i++)$ $\rightarrow n \text{ times}$
 $\text{for (int } j = 1; j \leq n; j++)$ $\rightarrow n \text{ times}$
 $\text{cout} << " " ;$
 $\Rightarrow O(n^2), \Omega(n^2), \Theta(n^2)$

5. $\text{for (int } i = 1; i \leq n; i++)$ $\rightarrow n \text{ times}$
 $\text{for (int } j = 1; j \leq n; j = j * 4)$ $\rightarrow O(\log_4 n)$
 $\text{cout} << " " ;$
 $\Rightarrow \Theta(n \log_4 n)$

6. $\text{for (int } i = 1; i \leq n; i = i * 2)$ $\rightarrow \log_2 n$
 $\text{for (int } j = 1; j \leq i; j++)$ $\rightarrow n \text{ times}$
 $\text{cout} << " " ;$
 \Rightarrow

$i = 1$	$i = 2$	$i = 4$	$i = 8$	$i = n$
$j = 1 \text{ to } 1$	$j = 1 \text{ to } 2$	$j = 1 \text{ to } 4$	$j = 1 \text{ to } 8$	$j = 1 \text{ to } n$
1	2	4	8	n

$\Rightarrow O(\log_2 n * n)$

7. $\text{for (int } i = 1; i \leq n; i++)$ $\rightarrow n$
 $\text{for (int } j = 1; j \leq n; j++)$ $\rightarrow n$
 $\text{for (int } k = 1; k \leq n; k = k * 3)$ $\rightarrow \log_3 n$
 $\text{cout} << " \text{Coder Army} " ;$
 $\Rightarrow O(n^2 * n^{\log_3 n})$

8. $O(n^3), \Theta(n^3), \Omega(n^3)$