

Answer on Question #62637 – Math – Algorithms | Quantitative Methods

Question

Give the most compact theta notation for the number of times the statement $x = x + 1$ is executed in the following pseudo-code:

```
for i = 1 to i =  $3n - 1$  {  
  for j = 1 to j = n {  
     $x = x + 1$   
  }  
}
```

Solution

The inner loop with index j performs the statement ' $x = x + 1$ ' n times.

The loop with index i performs the inner loop $(3n - 1)$ times.

Thus, both loops perform the statement ' $x = x + 1$ ' $(3n - 1)n$ times.

Here $(3n - 1)n = 3n^2 - n$ is a quadratic function, drop the factor 3 and the low-order term $-n$.

So the most compact theta notation for the number of times when the statement ' $x = x + 1$ ' is executed will be $\Theta(n^2)$.

Answer: $\Theta(n^2)$.