① function x = f(n)

```
x = 1;

for i = 1:n
    for j = 1:n
        x = x+1;
```

* The line `x = x+1;` runs for

$$\sum_{i=1}^{n} \sum_{j=1}^{n+1} = 1$$

* The line `for j = 1:n` runs for

$$\sum_{i=1}^{n} \sum_{j=1}^{n+1} 1$$

Time Complexity $T(n) = n^2 + n + n^2 + 1 + n + 1$

$\Rightarrow 3n^2 + 3n + 2$

where the highest degree polynomial is (n^2) so run time is $O(n^2)$

③ ~~The~~ Find polynomials That are upper Bound, Lower bound & specify big-O, big-omega & big-theta.

① → Big-O (upper bound)

⇒ $O(n^2)$ This function doesn't Grow even faster than The Asymptotic function

② Big-omega → (Lower bound)

⇒ This function also doesn't Grow Slower than The Asymptotic function

$\Omega(n^2)$

③ Big-Theta : This is our function which Grows Asymptotically as n^2.

If the function was to be modified.

```
x = f(n)
x = 1;
y = 1;

for i : 1 : n
    for j = 1 : n
        x = x + 1;
        y = i + j;
```

(4) Will this increase the Runtime?

→ Yes, This will increase the Runtime of The Newfunction Compared to previous one As $y = i + j$; has an Complexity of $O(1)$ This will Attribute a small increased Run time.

But the Time complexity is $O(n^2)$.

(5) NO, it won't effect our Results from #1

The effects won't be visible but on a significantly low on Runtime.