## HANDS ON-3

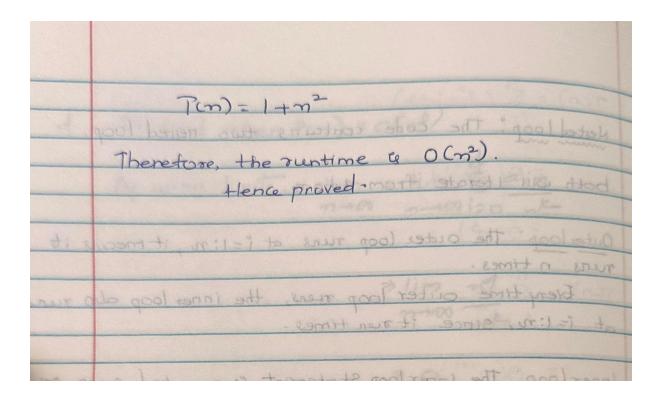
## DESIGN ANALYSIS AND ALGORITHMS

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1. Find the runtime of the algorithm mathematically (I should see summations).

Nested loop. The code contains two nested loop, both will iterate from I ton. Outer loop the outer loop runs at i=1:n, it means it rurs n times. Every time outer loop mens, the inner loop also mens at i=1:n, since it own times. Inner loop: The inner loop Statement & excuted once per iteration of inner loop. ie, x=x+1 Total steations: The inner loop runs on times for each iteration, the total sterations are n\*n=n2 Runtime: The runtime will be o(n2) T(n) = 1+ \( \sum\_{\subset} \sum\_{1} \) T(m) = 1 + 1 1 Tin) = It mt n



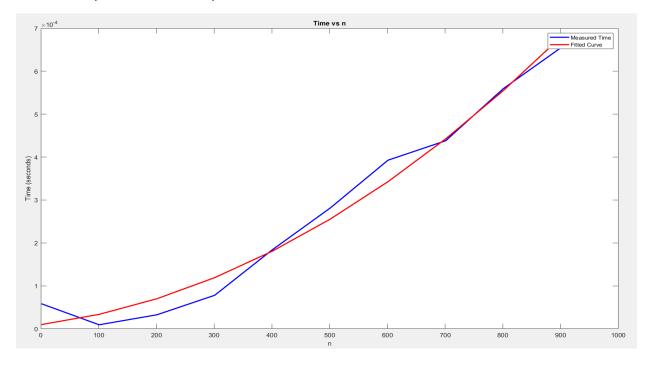
2.Time this function for various n = 1,2,3... You should have small values of n all the way up to large values. Plot "time" vs "n" (time on y-axis and n on x-axis). Also, fit a curve to your data, hint it's a polynomial.

The time vs n graph: Time on y axis

N on x-axis

Blue line: Represents the actual measured times.

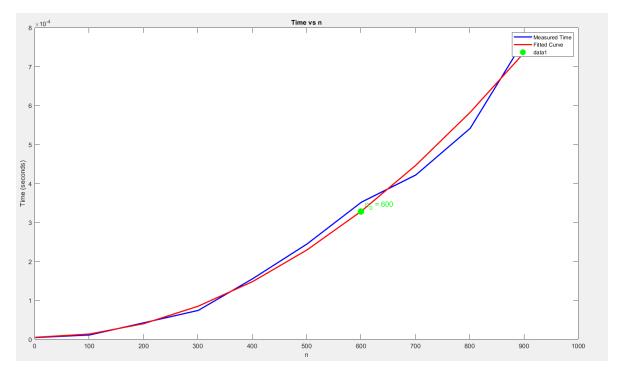
Red line: Represents the fitted quadratic curve.



3. Find polynomials that are upper and lower bounds on your curve from #2. From this specify a big-O, a big-Omega, and what big-theta is.

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3.	Bigo: A function fen) es said to be O(qcm)
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	c = h that f(m) > Cop(m), tol all n 7 no
	from the lower bound. the time complexity is mi,
	Therefore it a $\Omega(n^2)$ .
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	Big Thela! A fin) is said to be Olgin),
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	if there exist positive constant (c), co and no such that again = fen) = again) for all mzmo
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	Since the upper and lower bounds over nt, and then Bigtheta & Q(n2)
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	1cm)= H on 1)

4. Find the approximate (eye ball it) location of " $n_0$ ". Do this by zooming in on your plot and indicating on the plot where  $n_0$  is and why you picked this value. Hint: I should see data that does not follow the trend of the polynomial you determined in #2.



The time vs n graph :Time on y axis

N on x-axis

**Blue line:** Represents the actual measured times.

Red line: Represents the fitted quadratic curve

**GREEN** dot represents the data

If I modified the function to be:

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

4. Will this increate how long it takes the algorithm to run (e.x. you are timing the function like in #2)?

-	given function x=+(co) privilion and another
1	X=1;
	the overall runtime complexity; 1=4
	C. 1 - 1 ' n
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	Nested loop: The function has two nested loops.
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	runs from i=1:n
	Inner loop for the each iteration in outsloop, the inner
	loop sure from 1= (tor, this calso execute no tome.
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	1=1 ]=1
	To madified formation we ist operation material
	= 32, 77
	In modified function 4 ist operation performed
	but it toos not affect time complexity.
	フ 2*n*n
	TCn) = 2n
	1(n) - 2m
	Time complexity es o(n2).
	temper does not champer
	remarks same

There fore modifying the function does not change

the overall suntime Complexity:

Finally it wont change the asymptotic Complexity,

playnomial growth sale and summation

Joes not change; it still semains sceme.

## 5. Will it effect your results from #1?

Nested loop. The trunction tran mested loops
5. No, Overall time Complexity will remain some
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The runtime complexity remains same
O(n²),
Time Complexity & OCM)
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