Assignment 2

1. Order the following growth rates:

i. $n^2 + n$
ii. $50000 \cdot n + 3 \cdot \log(n)$
iii. $n^{7/6} + n^{5/6}$
iv. $90000 + \log(n)$
v. $\log(n) + n \cdot \log(n)$
vi. $n! + 2^n$
vii. $(n+1)! + 20000^n$
viii. $4^n + n^{500000}$

2. If you have a quadratic algorithm A and a computer C. Suppose you have an input size 1000 and compute the result in **t** milliseconds. How much input you can process in **t** milliseconds if you use another computer D which is 4 times **slower** than C in theory?

3. Suppose you have two applications, A and B for solving the same problem. If you do not have access to their source codes and only have access to their executable files, how can you decide which one is better?

4. What are the Big-Oh's of the following codes?

a.

```
for(i = 0; i < N; i++){
      for(j = 0; j < N; j++){
            sequence of statements
      }
}
for(k = 0; k < N; k++){
      sequence of statements
}
```

b.

```
for(i = 0; i < N; i++){
      for(j = N; j > i; j--){
            sequence of statements
      }
}
```

c.

```
for(i = 0; i < N; i++){
      for(j = 1; j > N; j *= 2){
            sequence of statements
      }
}
```

d.

```
for(i = 0; i < 10000; i++){
      for(j = 50; j > 1; j--){
            sequence of statements
      }
}
```