1. Analysis Example

- $n^2 + 5n - 2^{100} \in \theta(n^2)$
- $e^{n \log n} \in \omega(2^n)$
- $\sum_{i=1}^{n} i^d \in \theta(n^{d+1})$

2. Analysis Question, not an IQ Test!

Alice has a mirror, and she is interested in finding out how the strength of the mirror, she lives in a tower with n floors, and we know the strength of a mirror is k if the mirror breaks when Alice throws it from the k-th floor and does not break when Alice throws it from the (k-1)-th floor. (It is obvious that if the mirror does not break in (k-1)-th floor, it also does not break in floors 1, 2, …, k-2 either)

- Assuming Alice has exactly one piece of the mirror, give an algorithm for Alice, in a way that she finds out the strength of the mirror? Analyse the number of floors she visits.
- What if Alice has two pieces of the same mirror?
- What if Alice has many pieces of the same mirror?

3. Finding Prime Numbers from 1 to n

Analyze the following algorithms.

```
bool isPrime(int x) {
   for(int i = 2 ; i <= x ; i++)
      if(x % i == 0)
         return false
   return true
}
for(int i = 1 ; i <= n ; i++)
   if(isPrime(i))
      print(i)
```

```
bool isPrime(int x) {
   for(int i = 2 ; i <= sqrt(x) ; i++)
      if(x % i == 0)
         return false
   return true
}
for(int i = 1 ; i <= n ; i++)
   if(isPrime(i))
      print(i)
```

```
bool isPrime[n] intially all false
for(int i = 2 ; i <= n ; i++) {
   if(mark[i] == false) {
      print(i)
      for(int j = i+i ; j <= n ; j += i)
         mark[j] = false
   }
}
```