Lecture 16

Asymptotic Analysis
- method for describing limiting behavior
- study of the properties of a function

- In Computer Science, AA is the evaluation of the performance of an algorithm in terms of the input size \( n \), where \( n \) is very large.

Algorithm
- a finite set of precise instructions to solve a problem
- every algorithm is constructed using a finite set of statements

Simple C Statements

(1) Expressions

- printf
- scanf - read formatted data
- assignment statements - set \( a := 1 \)
2 Jump Statements
   goto, break, continue, return, etc.

3 Null statement
   ; → nothing happens

Rules for Constructing Statements
(From smaller statements)

if (condition)
  Statement 1
else
  Statement 2

if (condition)
  Statement(s)

Test

If

Else
2. for (initialization; termination; incrementation)

3. while (condition)
   statements

4. do-while statement

```c
int i=0;
do
   printf(i);
i = i+1
while (i<=5)
return 0
```
Choosing An Algorithm
- program w/ small amounts of data
  - USE EASIEST TO IMPLEMENT ALGORITHM
- program to be used & maintained by many people over a large period of time
Simplicity
Clarity
Efficiency (especially for large size problems)

Running Time
- amount of time it takes measured as a function of the size of the input (\( f(n) \))

Input Size
- Size of an array
- Vertices or edges of a graph
- Degree of a polynomial
- Number of elements in a matrix
- etc.

Homework: