كلية المأمون الجامعة

قسم هندسة تقنيات القدرة الكهربائية

المرحلة الثانية

Computer Application and programming

Algorithms and flowcharts

Algorithms and flowcharts are two different tools that are helpful for creating new programs, especially in computer programming. An algorithm is a step-by-step analysis of the process, while a flowchart explains the steps of a program in a graphical way.

Writing a logical step-by-step method to solve the problem is called the algorithm. In other words, an algorithm is a procedure for solving problems. In order to solve a mathematical or computer problem, this is the first step in the process.

An algorithm includes calculations, reasoning, and data processing. Algorithms can be presented by natural languages, pseudocode, and flowcharts, etc.

A <u>flowchart</u> is the graphical or pictorial representation of an algorithm with the help of different symbols, shapes, and arrows to demonstrate a process or a program. With algorithms, we can easily understand a program. The main purpose of using a flowchart is to analyze different methods. Several standard symbols are applied in a flowchart:
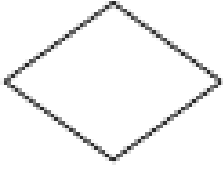
Commonly used symbols in detailed flowcharts

One step in the process. The step is written inside the box. Usually, only one arrow goes out of the box.
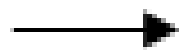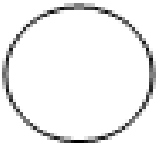
Direction of flow from one step or decision to another.

Decision based on a question. The question is written in the diamond. More than one arrow goes out of the diamond, each one showing the direction the process takes for a given answer to the question. (Often the answers are "yes" and "no.")

Delay or wait

Link to another page or another flowchart. The same symbol on the other page indicates that the flow continues there.
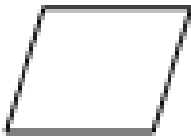
Input or output

Alternate symbols for start and end points

Algorithm

- It is a procedure for solving problems.
- The process is shown in step-by-step instruction.
- It is complex and difficult to understand.
- It is convenient to debug errors.
- The solution is showcased in natural language.
- It is somewhat easier to solve complex problem.
- It costs more time to create an algorithm.

Flowchart

- It is a graphic representation of a process.
- The process is shown in block-by-block information diagram.
- It is intuitive and easy to understand.
- It is hard to debug errors.
- The solution is showcased in pictorial format.
- It is hard to solve complex problem.
- It costs less time to create a flowchart.

Example 1: Write an algorithm and draw a flowchart that will Print 1 to 20:
Algorithm:

- Step 1: start
- Step 2: Initialize X as 0,
- Step 2: Increment X by 1,
- Step 3: Print X,
- Step 4: If X is less than 20 then go back to step 2.
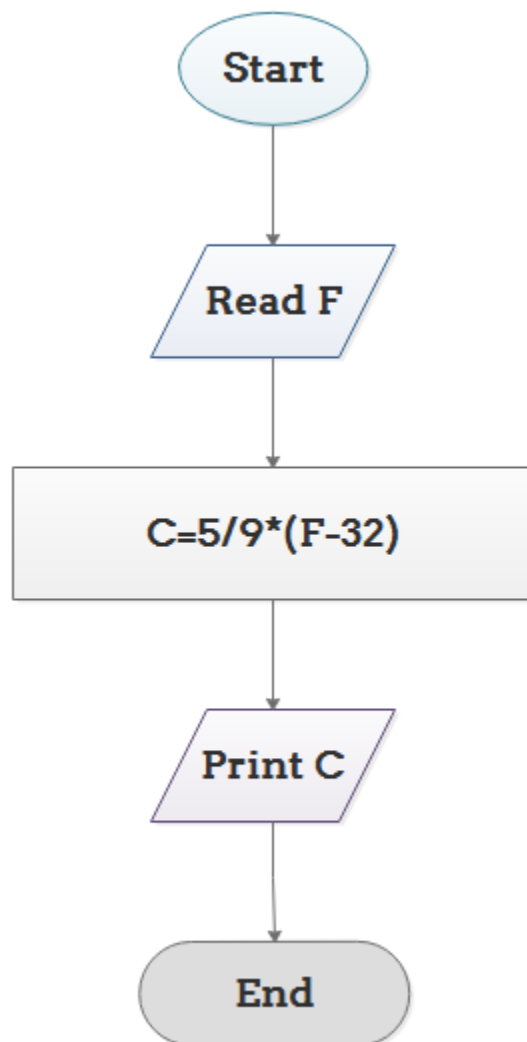- Step 5 : end

Flowchart:
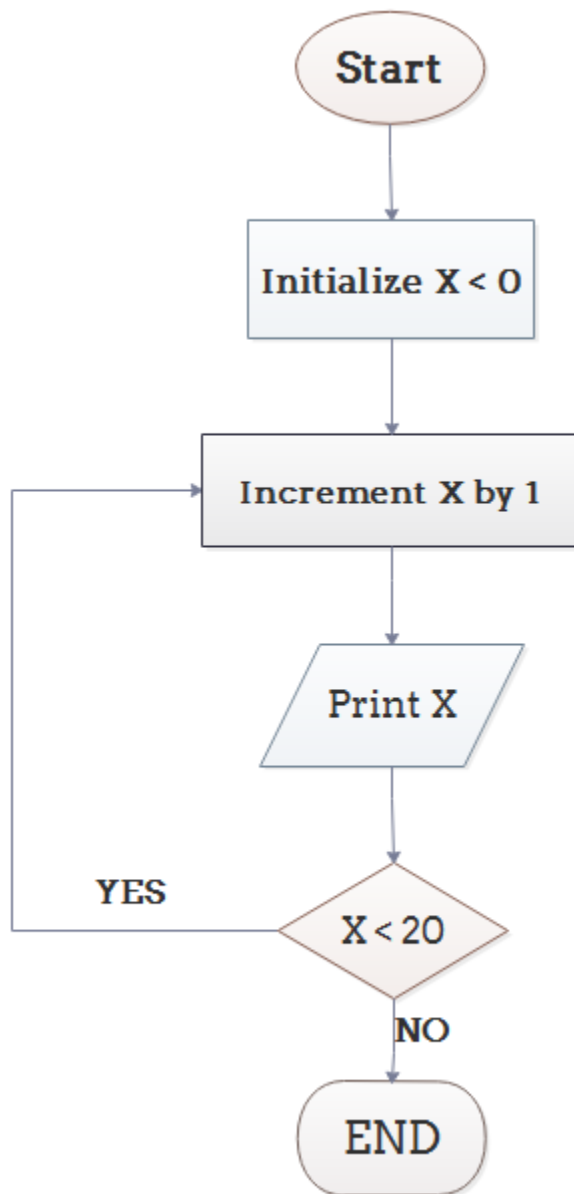
Example 2: Convert Temperature from Fahrenheit (℉) to Celsius (℃)

Algorithm:

- Step 1: start
- Step2 : Read temperature in Fahrenheit,
- Step3: Calculate temperature with formula C=5/9*(F-32),
- Step 4: Print C.
- Step 5: end

Flowchart:

```
        ┌──────────┐
        │  Start   │
        └────┬─────┘
             │
             ▼
        ╱──────────╱
        ╱  Read F  ╱
        ╱──────────╱
             │
             ▼
     ┌──────────────────┐
     │  C=5/9*(F-32)    │
     └────────┬─────────┘
              │
              ▼
        ╱──────────╱
        ╱  Print C ╱
        ╱──────────╱
             │
             ▼
        ┌──────────┐
        │   End    │
        └──────────┘
```

HW: 2 flowchart for Find the area of a circle of radius r.

Step1: start

Step 2 : read r

Step 2 : let Area = 3.14 * r*r

Step 3: print Area

Step 4 : end

```
                    ┌──────────────┐
                    │    START     │
                    └──────────────┘
                           │
                           ▼
                    ╱──────────────╱
                   ╱    READ r     ╱
                  ╱───────────────╱
                           │
                           ▼
                 ┌─────────────────────┐
                 │  AREA = 3.14 * r * r │
                 └─────────────────────┘
                           │
                           ▼
                 ╱────────────────────╱
                ╱    PRINT AREA       ╱
               ╱────────────────────╱
                           │
                           ▼
                    ┌──────────────┐
                    │     END      │
                    └──────────────┘
```
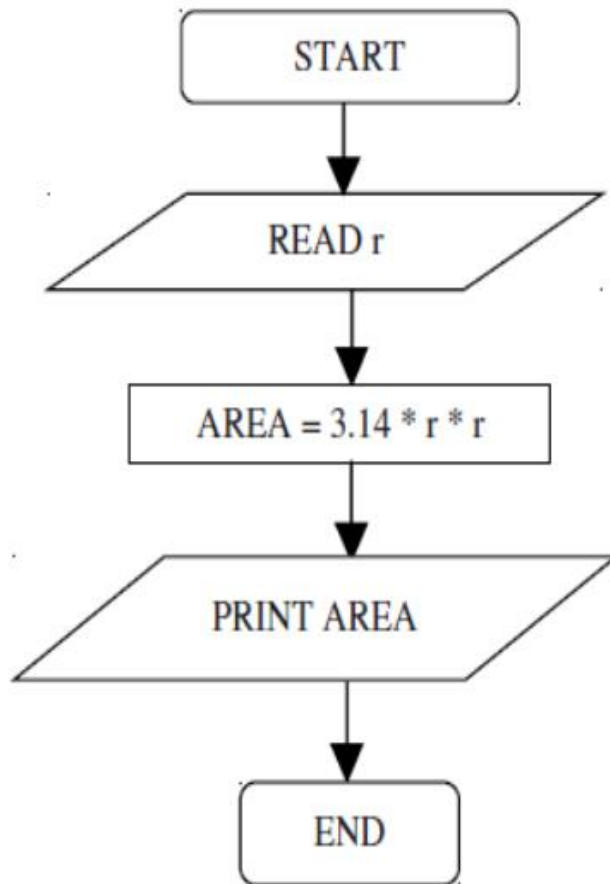
HW: 3 Write an algorithm and draw a flowchart for find the greater number between two numbers.
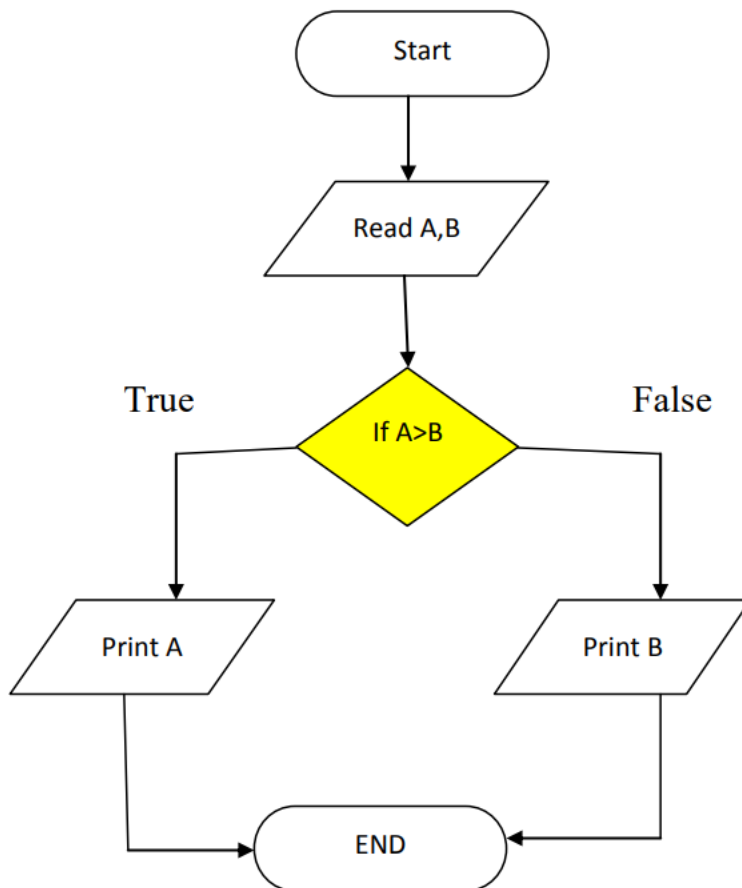
Step1: start

Step 2 : read A,B

Step 2 : if(A>B) go to Step3 else go to step4

Step 3: print A then got o step 5

Step 4 : print B

Step 5: end

HW: Write an algorithm and draw a flowchart To check greatest of three numbers
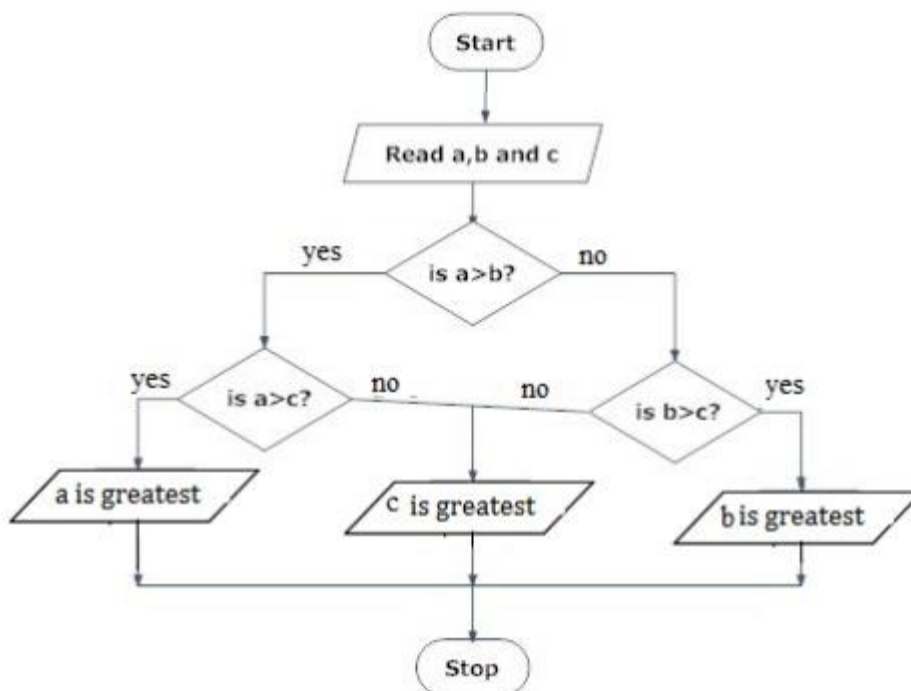
Step1: Start

Step2: Get A, B, C

Step3: if(A>B) go to Step4 else go to step5

Step4: If(A>C) print A else print C

Step5: If(B>C) print B else print C

Step6: Stop

H.W: 1- Write an algorithm and draw a flowchart that will read the two sides of a rectangle and calculate its area.