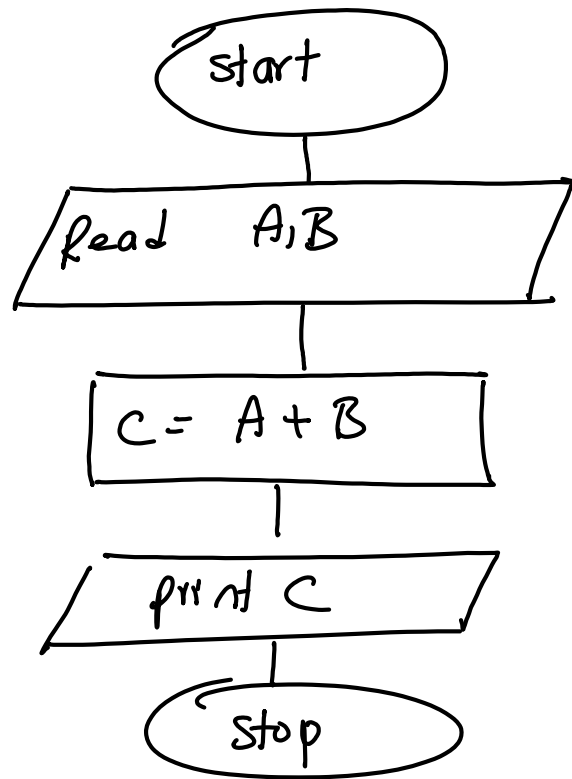


Review

- Program
- Computer program
- High-level programming
- Machine code
- low-level programming
- ASCII
- Compiler // Interpreter
- Syntax

Flowchart



* Program

* Trace

* Variable

* operator

* How to Read // write

Body mass Index

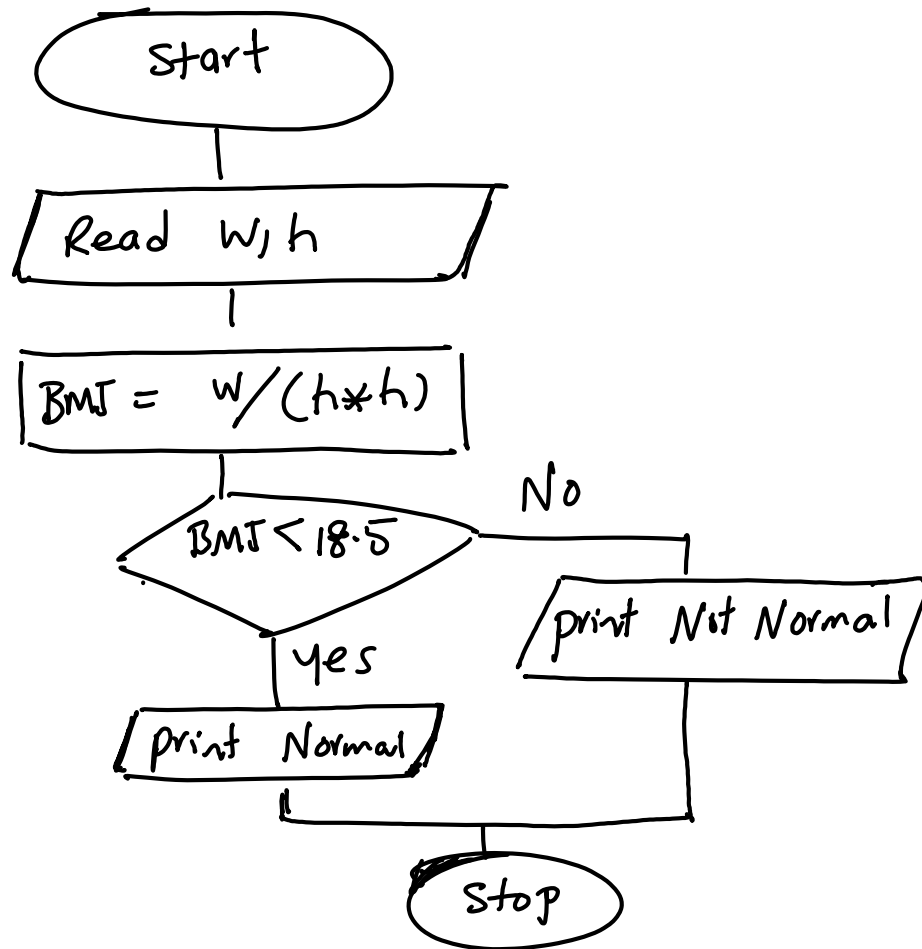
Start

Read w, h

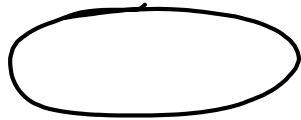
$BMI = w / (h * h)$

print BMI

Stop

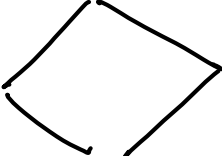


In brief

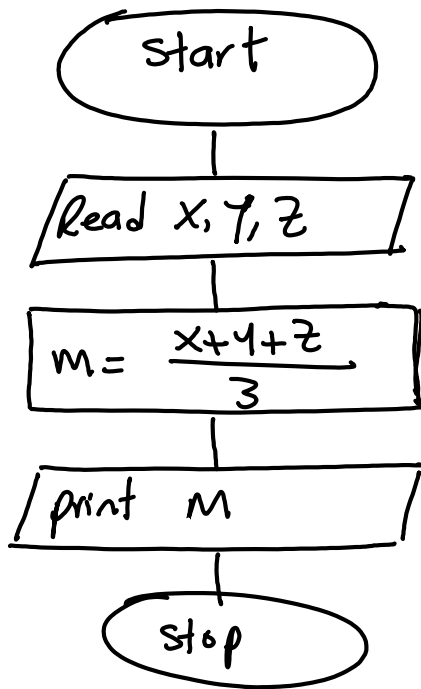
 $\Rightarrow$ start // begin
stop // end

 $\Rightarrow$ Read // output
Input // write // print

 $\Rightarrow$ Calculate

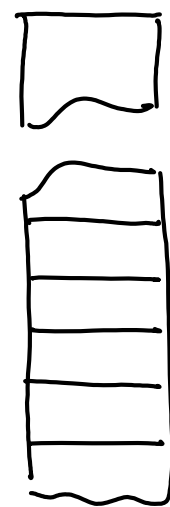
 $\Rightarrow$ branch // condition

Example

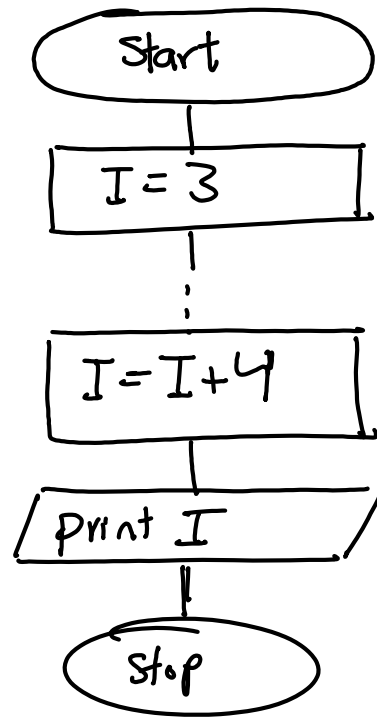


Trace
x = 5
y = 6
z = 7

RAM



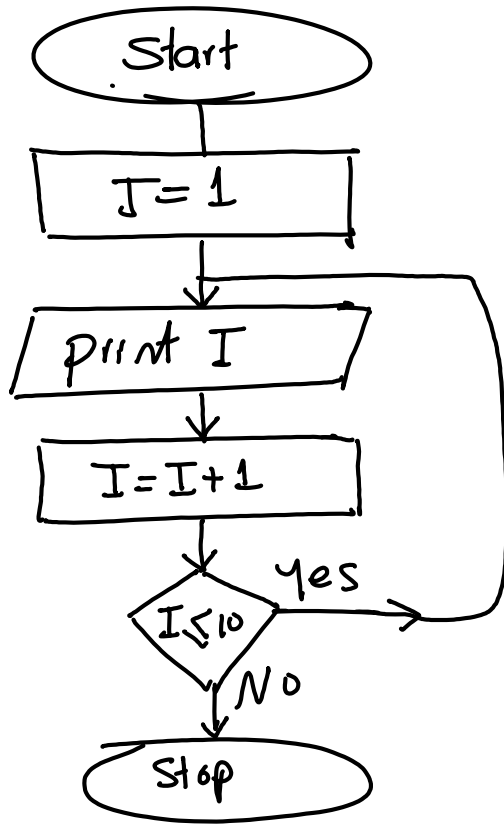
Ex



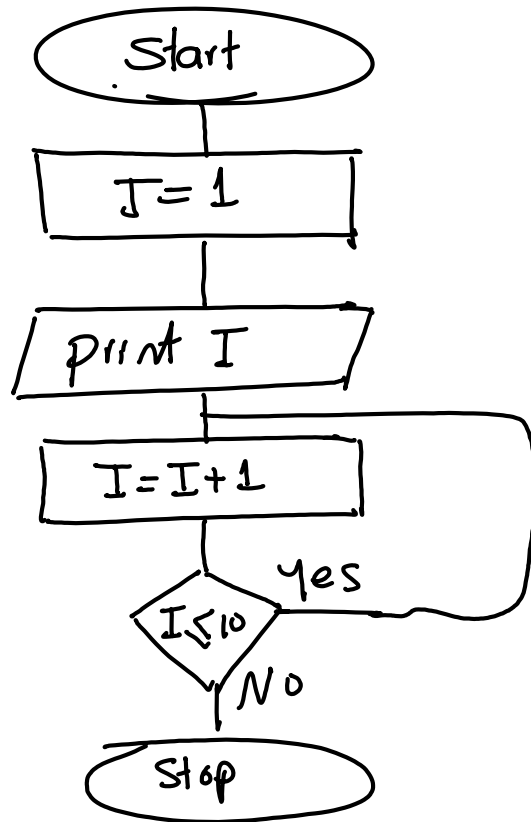
Trace

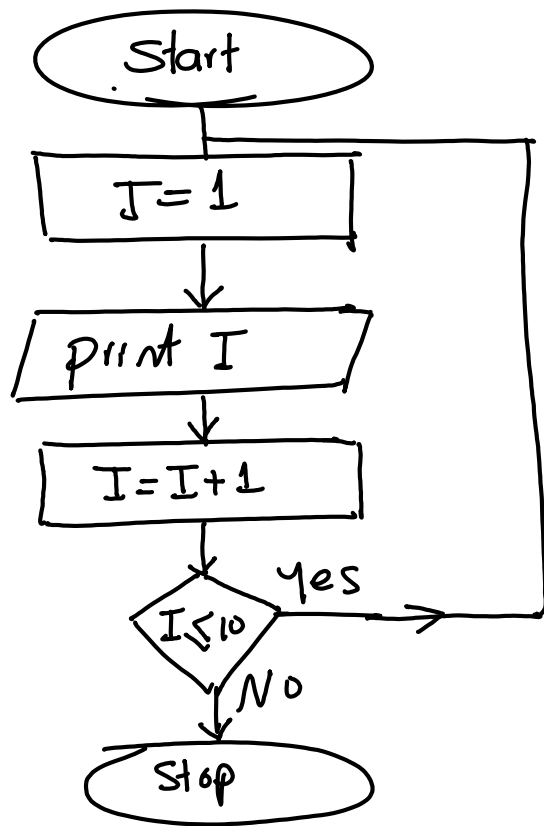
$I = 3$

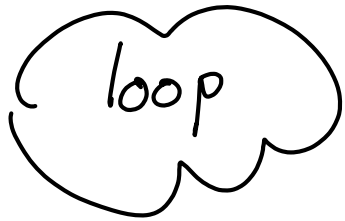
what $I = I + 4$



Trace







$\Rightarrow$ repeated code

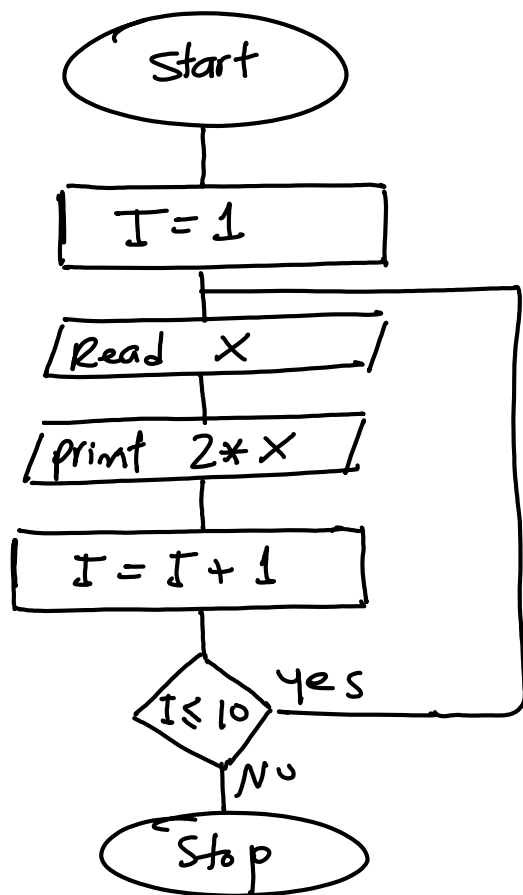
① Initialization

Index $\leftarrow$ start

② update

③ check up

Ex



pseudocode

Read weight

Read height

Calculate $BMI = \frac{\text{weight}}{\text{height} \times \text{height}}$

if $BMI < 18.5$ then
 print "you are Normal"
else
 print "abnormal"

Read weight

Read height

Calculate BMI = $\frac{\text{weigh}}{\text{height} \times \text{height}}$

if BMI < 18.5 then

print "you are Normal"

else

print "abnormal"

```
In [1]: from math import pow
w = float(input("Your weight: "))
h = float(input("Your height: "))
BMI = w/pow(h,2)
if BMI <18.5:
    print("Normal")
else:
    print("Upnormal")
print("BMI: ",BMI)
```

Your weight: 96

Your height: 1.78

Upnormal

BMI: 30.299204645878046

```
In [51]: x = float(input("Side 1: "))
y = float(input("side 2: "))
h = (x**2 + y**2)**0.5
print("Hypot = ",h)
```

```
Side 1: 12
side 2: 5
Hypot = 13.0
```

```
In [52]: import math
x = float(input("Side 1: "))
y = float(input("side 2: "))
h = math.sqrt((x**2 + y**2))
print("Hypot = ",h)
```

```
Side 1: 12
side 2: 5
Hypot = 13.0
```

```
In [53]: from math import sqrt
x = float(input("Side 1: "))
y = float(input("side 2: "))
h = sqrt((x**2 + y**2))
print("Hypot = ",h)
```

```
Side 1: 12
side 2: 5
Hypot = 13.0
```

```
In [54]: from math import hypot
x = float(input("Side 1: "))
y = float(input("side 2: "))
h = math.hypot(x,y)
print("Hypot = ",h)
```

```
Side 1: 12
side 2: 5
Hypot = 13.0
```

Hardware

- Input unit
 - Output unit
 - CPU
- ← ALU

Software

- Operating system
- Programming language
- Application programs

machine code

0, 1

0

⇒ cell contains 1, 0 ⇒ bit

1

8-bit ⇒ 1000 0100 ⇒ byte

0	0	↑
0	1	→
1	0	←
1	1	↓

2 bit ⇒ 4 combinations

3-bit ⇒ 8 combinations

8-bit ⇒ 256 combinations

Report

$y =$

$$\begin{cases} 4x + 5 \\ \frac{2}{x + 8} \end{cases}$$

$$x < 3$$

otherwise

Flow chart

Pseudocode