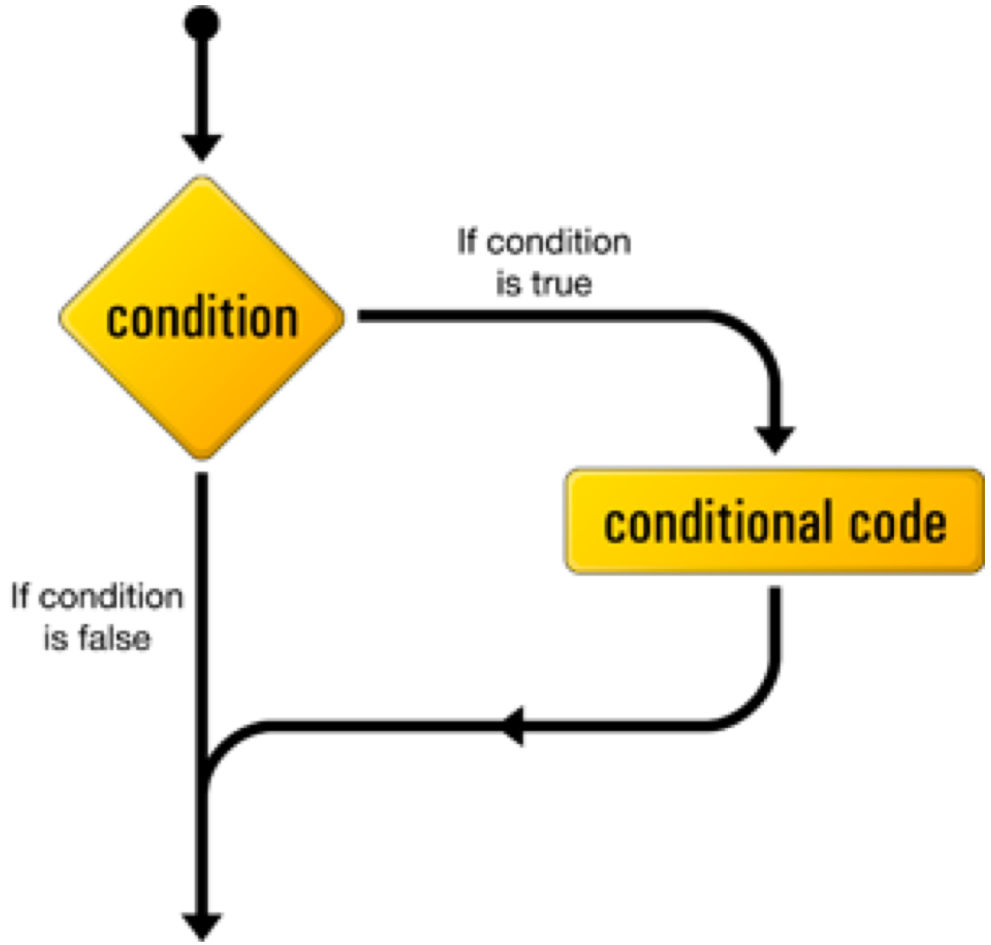
# מבוא לתכנות מתמטי

Flow control

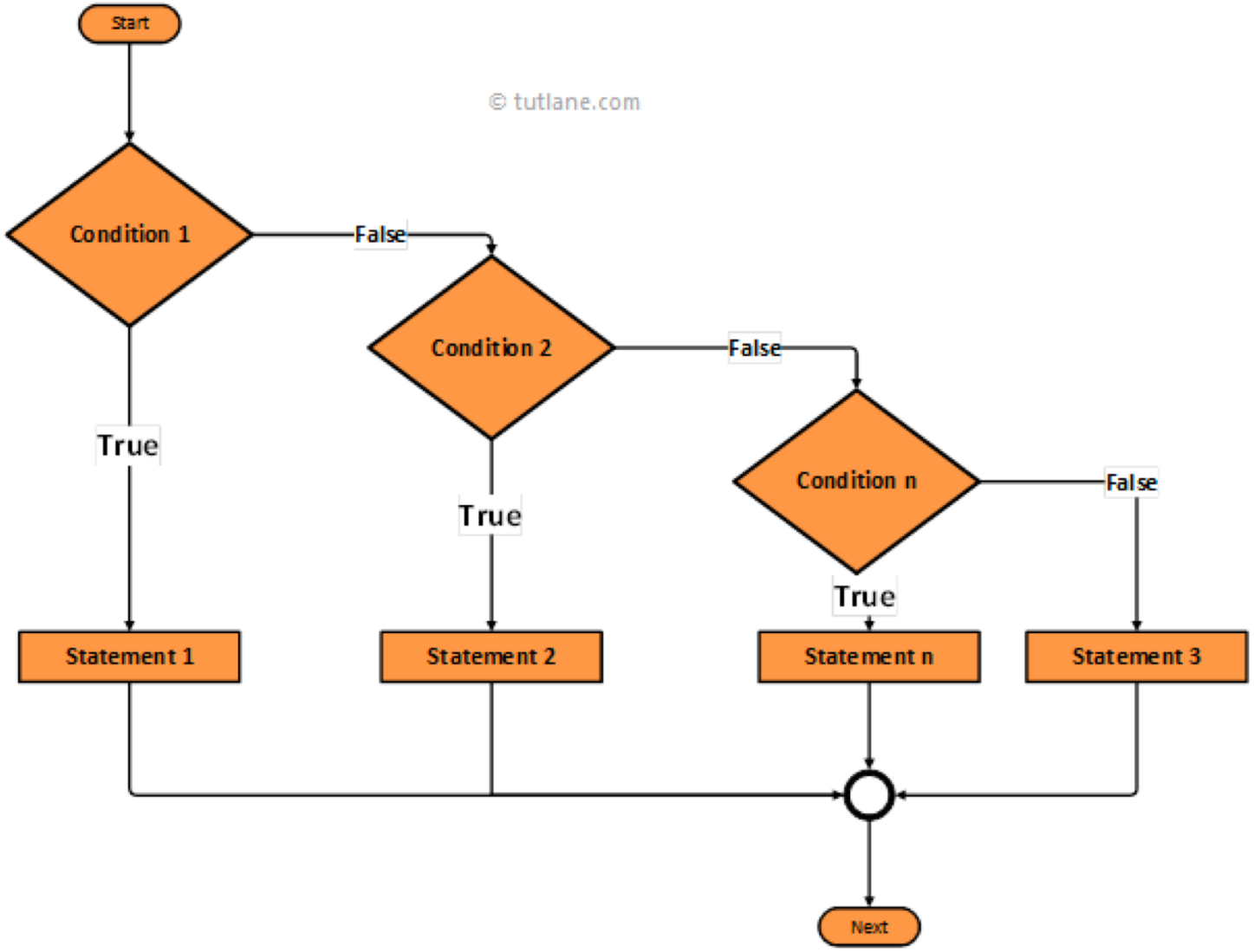
# בתוכנית:

- if statement
- for loop
- While loop

# If – else-end statement



# If – elseif-else-end statement



# if statement  syntax

```
% if statement ----------------------
% syntax

bool_exp_1 = false;
bool_exp_2 = true;

if bool_exp_1
      fprintf("1_True\n")
elseif bool_exp_2
     fprintf("2_True\n")
else
      fprintf("1_2_False\n")
 end
```

# if statement  syntax

```
% if statement ----------------------
% syntax

bool_exp_1 = false;
bool_exp_2 = true;

if bool_exp_1
     fprintf("1_True\n")
elseif bool_exp_2
    fprintf("2_True\n")
else
     fprintf("1_2_False\n")
 end
```

```
>> recitiation_2
2_True
```

# תרגיל if statement

```
% Input from user
num1 = input('Enter first number');
num2 = input('Enter second number');
num3 = input ('Enter third number');

if (num1>num2)
    if (num1 >num3)
        display(num1);
    else
        display(num3);
    end
else
    if (num2>num3)
        display(num2);
    else
        display(num3)
    end
end
```

מה עושה התוכנית הבאה?

# תרגיל if statement

```
% Input from user
num1 = input('Enter first number');
num2 = input('Enter second number');
num3 = input ('Enter third number');

if (num1>num2)
    if (num1 >num3)
        display(num1);
    else
        display(num3);
    end
else
    if (num2>num3)
        display(num2);
    else
        display(num3)
    end
end
```

מה עושה התוכנית הבאה?
מדפיסה את האיבר הגדול ביותר

```
Enter first number4
Enter second number2
Enter third number5

num3 =

     5
```

# אופרטורים

- אופרטורים לוגיים:

AND (&)  OR(|)  NOT(~)

- 0-False,Else:True

```
>> 3|6

ans =

  logical

   1

>> 3|0

ans =

  logical

   1

>> 0|0

ans =

  logical

   0

>> 3&0

ans =

  logical

   0

>> 4&8

ans =

  logical

   1

>> ~0

ans =

  logical

   1
```

# אופרטורים

- פעולות השוואה - מחזירות 1(״אמת״) או 0(״שקר״):

| | |
|---|---|
| < | Less than |
| > | Greater than |
| <= | Less than or equal to |
| >= | Greater than or equal to |
| == | Equal to |
| ~= | Not Equal to |

```
>> 5>8

ans =

     0

>> a=5<10

a =

     1
```

# אופרטורים: תרגיל –מה הפלט של כל תוכנית?

```
y=(6<10)+(7>8)+(5*3==60/4)
```

1

2.

```
num=5;

if num == 5
    fprintf("True")
else
    fprintf("False")
end
```

3.

```
x = 5>6;
if x
    fprintf("True")
end
```

# אופרטורים: תרגיל –מה הפלט של כל תוכנית?

1

```
y=(6<10)+(7>8)+(5*3==60/4)
```

2

.2

```
num=5;

if num == 5
    fprintf("True")
else
    fprintf("False")
end
```

True

.3

```
x = 5>6;
if x
    fprintf("True")
end
```

אין פלט

# For Loops

```
%for loop ----------------------------
%syntax

for i = 1:3:12
      disp(i)
end
```

Output:

```
1

4

7

10
```

# For Loops

- it is very advisable to preallocate memory for the results:

```
for n=1:10
    x(n)=sin(n*pi/10);
end
```

```
x=zeros(1,10); % preallocation
for n=10:-1:1
    x(n)=sin(n*pi/10);
end
```

# For Loops

- it is very advisable to preallocate memory for the results:

```
for n=1:10
    x(n)=sin(n*pi/10);
end
```

```
x=zeros(1,10); % preallocation
for n=10:-1:1
    x(n)=sin(n*pi/10);
end
```

# For Loops

```
% Nested loop
A=zeros(4,5);
for i=1:size(A,1)
    for j = 1:size(A,2)
        A(i,j)=i+j;
    end
end
disp(A);
```

```
>> recitiation_2
     2     3     4     5     6
     3     4     5     6     7
     4     5     6     7     8
     5     6     7     8     9
```

# For loops

```
i=0;
for n=(1:10)'
    i=i+1;
End
>> i
i =
    1
```

# Break and continue

## break stops the FOR loop

```
for i=1:10
    if i == 5
        break
    end
    disp(i)
end
```

Output:

```
1

2

3

4
```

## continue jumps to the end

```
for i=1:10
    if i == 5
        continue
    end
    disp(i)
end
```

Output:

```
1

2

3

4

6

7

8

9

10
```

# תרגיל

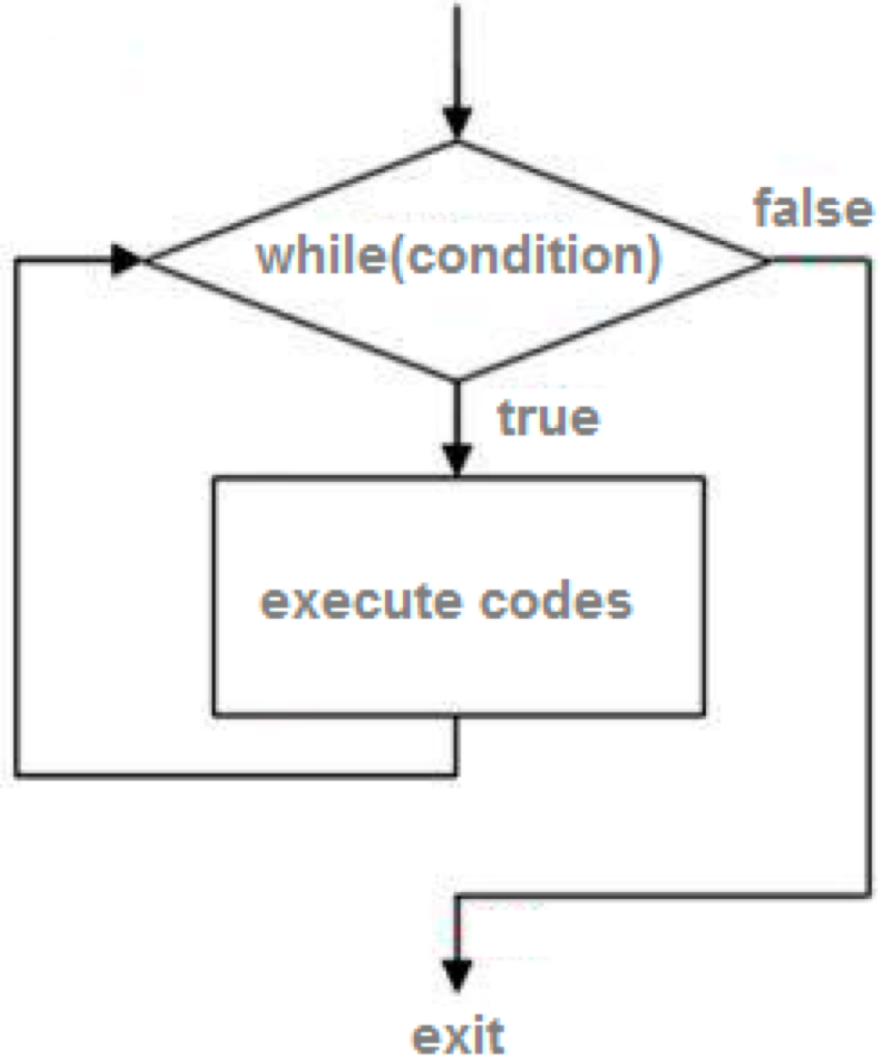
- כתבו תוכנית שבודקת שמקבלת מספר טבעי (ניתן להניח שהקלט תקין) ובודקת שהמספר ראשוני.

# תרגיל

```
flag=1;
num=input('Enter number');


if num>2
    if mod(num,2) == 0
        flag=0;
    else
        for i= 3:sqrt(num)
            if mod(num,i)==0
                flag=0;
                break
            end
        end
    end
end
disp(flag)
```

# While loop



```
%while loop -------------------------
 v = 0:0.1:1;
 i = 1;
 while i <= length(v)
     disp(v(i));
     i = i + 2;
end
```

```
>> recitiation_2
     0

    0.2000

    0.4000

    0.6000

    0.8000

     1
```

```
num=0; EPS=1;
while(1+EPS)>1
    EPS=EPS/2;
    num=num+1;
end
EPS=EPS*2;
>> num
num =
    53
>> EPS
EPS =
  2.2204e-016
```