

Introduction to MATLAB

Week 4 Tuesday

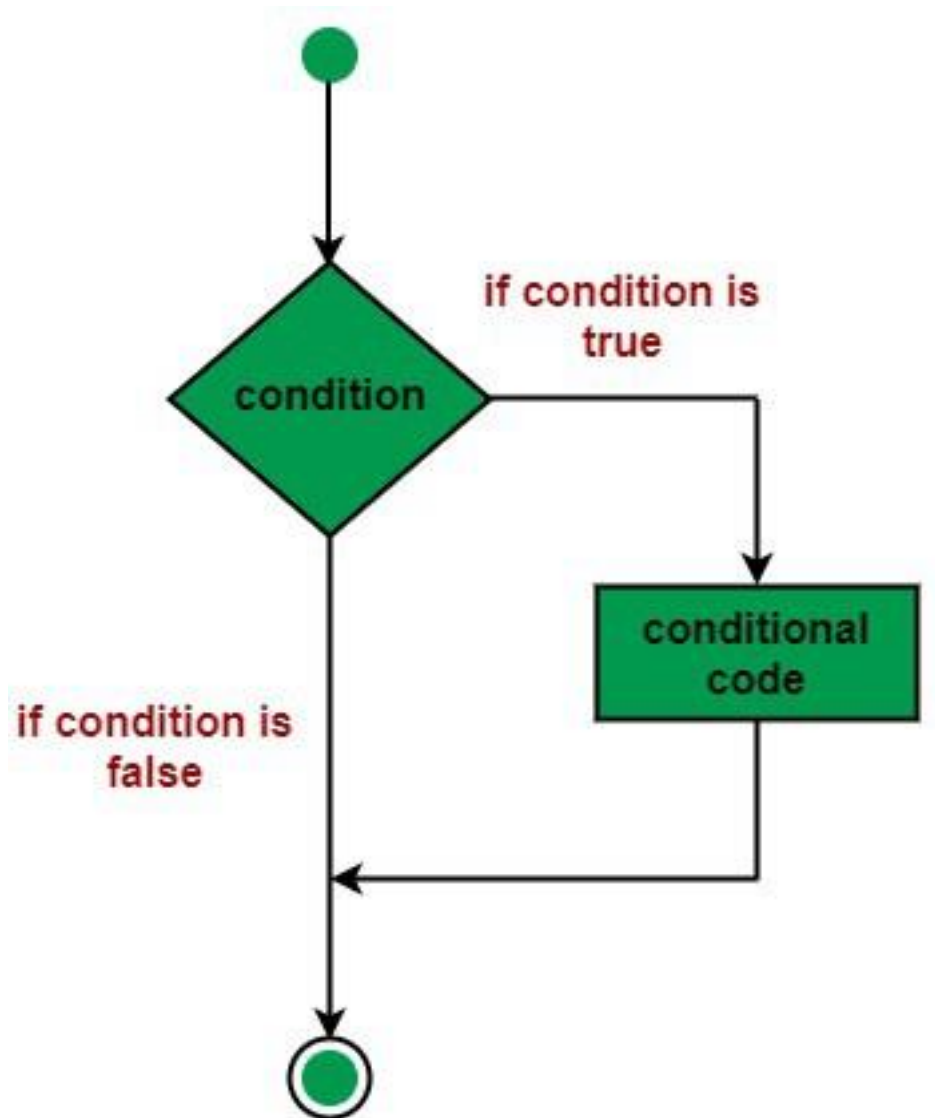
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Topics for today's class

- If statement
- While loop
- For loop

If statement

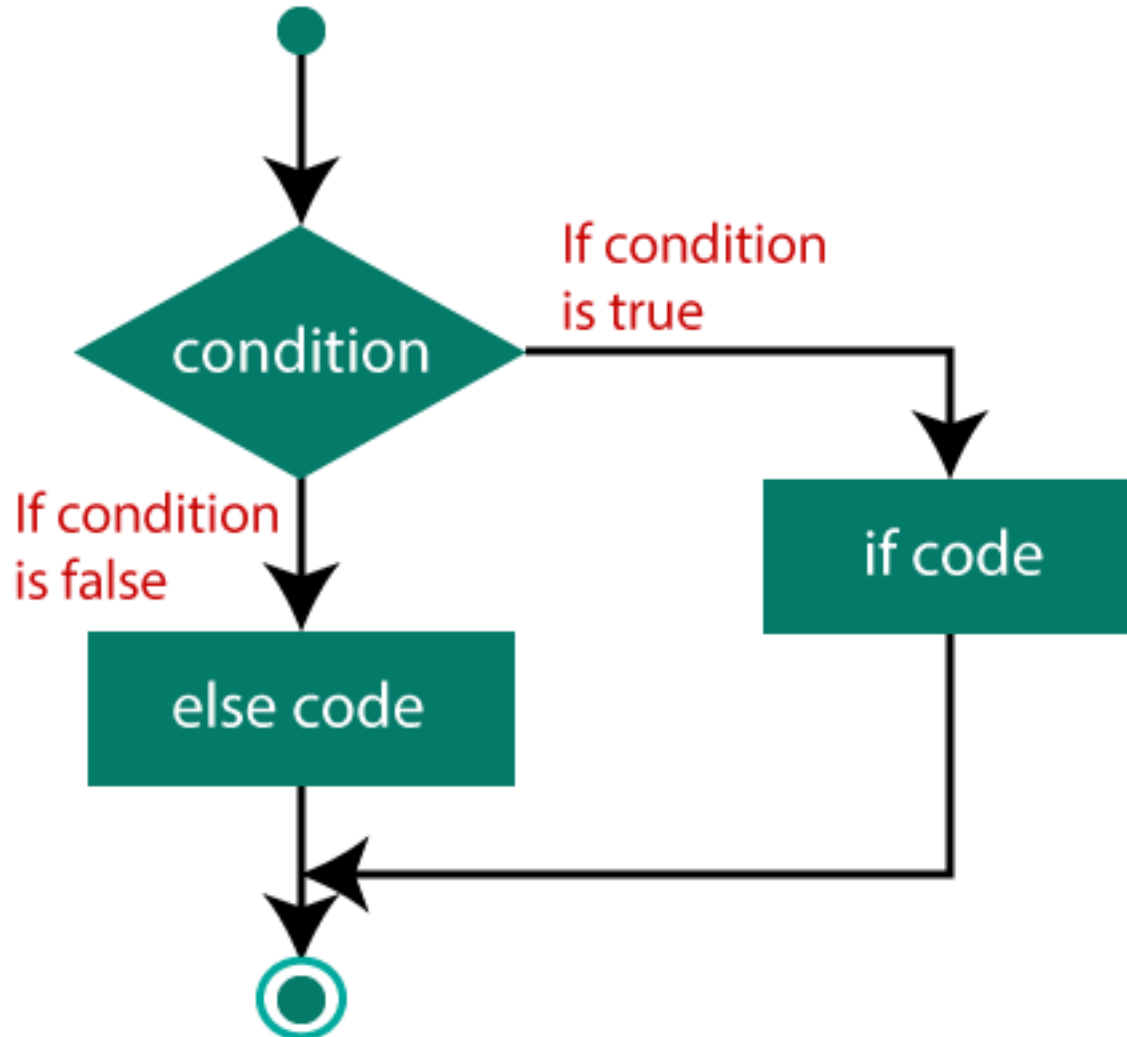


```
number = 0;  
if number==0  
    disp('number equals zero')  
end
```

What would this code output?

What would this code output if number = 4?

If else statement



```
number = 0
if number==0
    disp("number equals zero")
else
    disp("number doesn't equal zero")
end
```

What would this code output?

What would this code output if number = 4?

Exercise 1: Write an if / else statement!

Generate a 4-element array of random integers.

Return “The sum is ____ and it is greater than 20” if the sum of the array is greater than 20

Return “The sum is ____ and it is less than 20” if the sum of the array is less than 20.

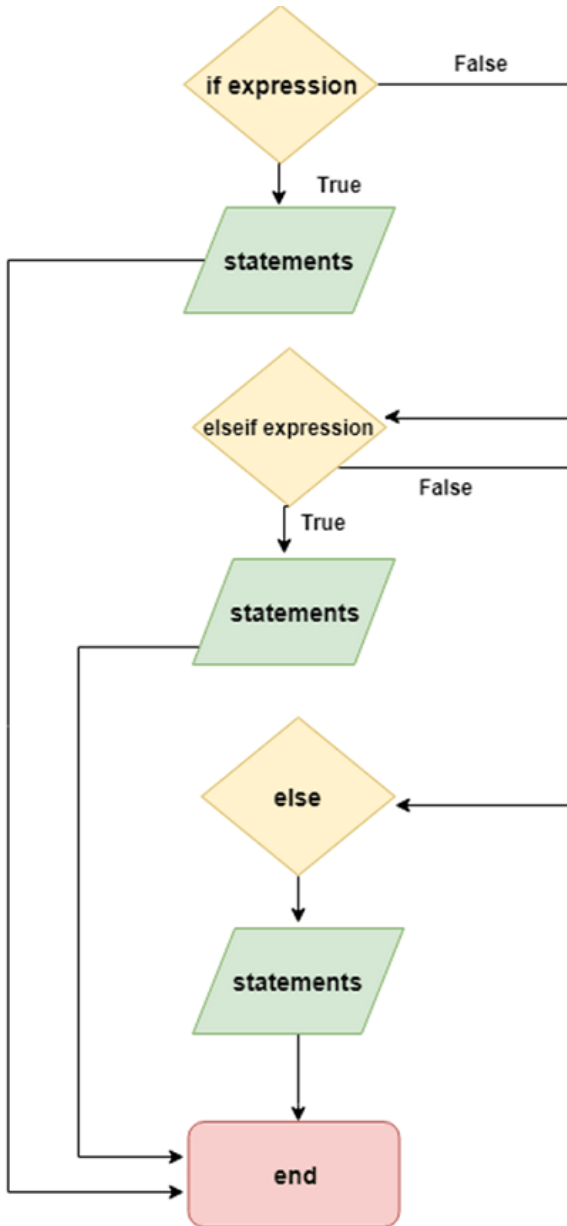
If elseif... else statement

```
number = 3
if number==0
    disp("number equals zero")
elseif number==3
    disp("number equals three")
else
    disp("number doesn't equal zero or three")
end
```

What would this code output?

What would this code output if number = 0?

What would this code output if number = 4?



Exercise 2: Write an if / elseif statement!

Generate a 4-element array of random integers.

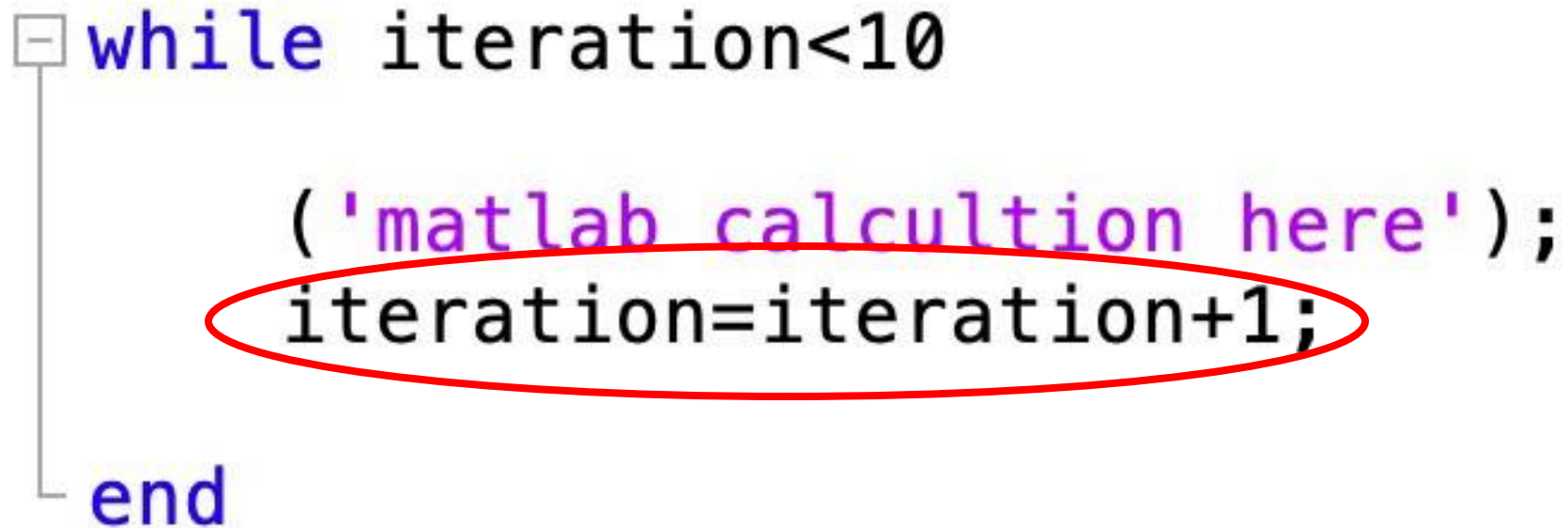
Return “The sum is ____ and it is greater than 20” if the sum of the array is greater than 20

Return “The sum is 20” if the sum of the array is equal to 20

Return “The sum is ____ and it is less than 20” if the sum of the array is less than 20.

While loop

```
iteration=1;
```

```
A diagram illustrating a while loop structure. A vertical line on the left side connects the 'while' keyword to the 'end' keyword. A small square box is located at the top of this line, next to the 'while' keyword. The code is as follows:  


```
while iteration<10
 ('matlab cultion here');
 iteration=iteration+1;
end
```


```


While loop

%% while loop increasing increment

```
itr=1;
while itr<5
    disp(['current iteration is: ' num2str(itr)])
    itr=itr+1;
end
```

%% while loop decreasing increment

```
clc

itr=10;
while itr>1
    disp(['current iteration is: ' num2str(itr)])
    itr=itr-1;
end
```

%% while loop in different incremental steps

```
clc

itr=1;
while itr<10
    disp(['current iteration is: ' num2str(itr)])
    itr=itr+2;
end
```

While and if loop

```
%%%% combine while loop and if loop
```

```
clc
```

```
clear
```

```
array=[-5 -2 -5 -4 4 2 -2 5 0 -1];
```

```
i=1;
```


```
while i<11
    test_num=array(1,i);
    if test_num>0
        disp([num2str(test_num) ' is a positive integer'])
    elseif test_num<0
        disp([num2str(test_num) ' is a negative integer'])
    else
        disp([num2str(test_num) ' is zero'])
    end
    i=i+1;
end
```

Exercise 3: Write a while loop!

Generate a 5-element array of random integers.

For each element of the array, if the element is greater than 5 or equal to 1, return the element.

For loop

```
 for iteration= 1:10  
    ('matlab calcultion here');  
end
```

For loop

```
[-] for i=1:10  
    disp(['current iteration is: ' num2str(i)])  
end
```

```
[-] for i=10:-1:1  
    disp(['current iteration is: ' num2str(i)])  
end
```

```
[-] for i=3:2:10  
    disp(['current iteration is: ' num2str(i)])  
end
```

```
[-] for i=[1 5 7 10]  
    disp(['current iteration is: ' num2str(i)])  
end
```

Exercise 4: Write a for loop!

Solve the problem in Exercise 3 using a for loop instead!

Generate a 5-element array of random integers.

For each element of the array, if the element is greater than 5 or equal to 1, return the element.

Nesting loops

We can nest if, while and for loops!

```
for i=1:3
    for j=1:3
        disp(i*j)
    end
end
```

1

2

3

2

4

6

3

6

9

Nesting loops

Is there a difference between these two sections of code?

```
if array(3)==2
    if array(4)>6
        disp("six")
    else
        disp("two")
    end
end
end
```

```
if array(3)==2
    disp("two")
elseif array(4)>6
    disp("six")
end
```


Exercise 5: Add the elements of two matrices

Generate two random 3x4 matrices consisting of integers between -6 and 6.

Write a nested for loop that creates a new 3x4 matrix called `sum_matrix` that contains the sum of the two matrices.

Breaking loops

Using **break** in a loop stops everything and exits the loop

```
%% using break in while loop
```

```
a = 1;
```

```
while (a < 10 )
```

```
    disp(['value of a is :', num2str(a)]);
```

```
    a = a + 1;
```

```
    if( a > 5)
```

```
        break; % terminate the loop using break statement
```

```
    end
```

```
end
```

```
%% using break in for loop
```

```
for jj=1:10
```

```
    disp(['value of iteration is :', num2str(jj)])
```

```
    if jj>7
```

```
        break
```

```
    end
```

```
end
```

Continuing loops

Using `continue` in a loop stops the current iteration and then continues with the next one

```
%% using continue in for loop to skip iteration
for n = 1:50
    if rem(n,9)
        continue
    end
    disp(['Divisible by 9: ' num2str(n)])
end
```

Exercise 6: Text chain

We have 5 contacts on our phone: Abby, Bob, Carl, Doris, and Mom. Let's send each of them a text message using a for loop!

For each contact,
print "I'm going out" if the contact is Mom,
don't print anything if the contact is Bob (we don't really like him),
and print "let's hang out" for everyone else