Review of Lecture 9

- **Main parts of a function**

```
function [out1, out2, ...] = fName(in1, in2, ...)
      instructions
end
```

- **Local variables and Global variables**

```
function  myF
global B
A = 10;
B = B + A ;
end
```

Some functions are useful when using global variables:

`isglobal(var), who global, clear global, clear VAR`

- **Anonymous function**

```
fvar  = @(arguments) expression
```

```
>> F = @(x) 2*x^2 +3*x -2;
>> F(3)
 ans =
     25
```

Info 3

Introduction to MATLAB

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Lecture 10

Practical examples

Example 1: BMI calculator

This function computes the Body Mass Index (BMI) helping to assess health risk. The weight and the height are given in kilograms and meters respectively.

$$BMI = \frac{weight}{height^2}$$

Normal : 18.5 – 24.9
Overweight : 25.0 – 29.9
Obese : 30.0 – 34.9

```
function bmi = BMIcalculator (weight, height)

      % This function computes the Body Mass

      % Index (BMI).

  bmi = weight / height^2;
end
```

Example 1: BMI calculator

This function computes the Body Mass Index (BMI) helping to assess health risk. The weight and the height are given in kilograms and meters respectively.

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Normal : 18.5 – 24.9
Overweight : 25.0 – 29.9
Obese : 30.0 – 34.9

```
function bmi = BMIcalcu

      % This function co
      % Index (BMI).
  bmi = weight / height
end
```

```
>> BMIcalculator(75, 1.85)

ans =

   21.9138
```

Example 2: Population growth

This function estimates the population growth using an exponential model given by .

$$population = initial\ pop\ \times e^{(growthrate \times time)}$$

```
function pop = popGrowth (initialPop, growthRate, time)

      % This function computes the population growth.

  pop = initialPop * exp(growthRate * time);
end
```

Example 2: Population grov

This function estimates the population growth using an exponential model given by .

$$population = initial\ pop \times e^{(growthrate \times time)}$$

```
function pop = popGr

      % This functio

  pop = initialPop *

end
```

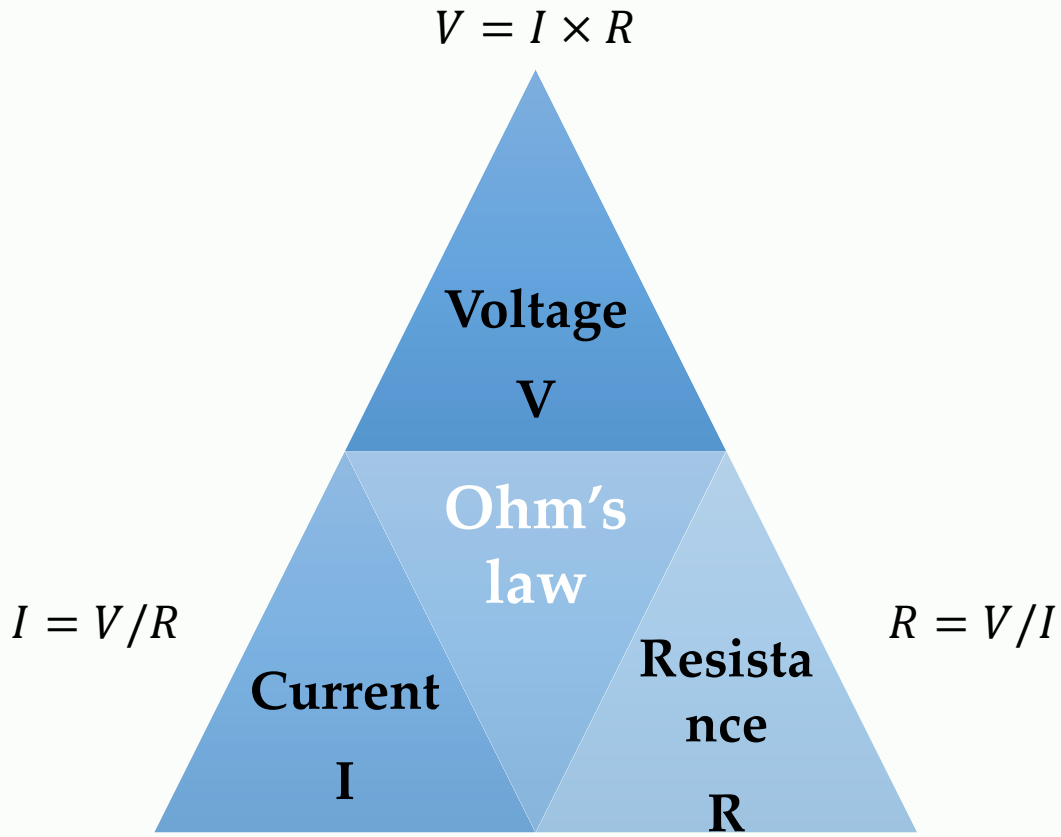
```
>> popGrowth (5000, 0.06, 10)

ans =

    9.1106e+03
```

Example 3: Ohm's law calculation in electrical circuit

This function calculates the current, resistance or the voltage in an electrical circuit using Ohm's law. It calculates the non-given value if the two other values are given.



Example 3: Ohm's law calculation in electrical circuit

This function calculates the current, resistance or the voltage in an electrical circuit using Ohm's law. It calculates the non-given value if the two other values are given.

```
function result = ohmsLaw (current, resistance, voltage)
      % This function computes the current, resistance or the voltage in
      % an electrical circuit.
      % Provide only two values and leave one empty!
  if isempty(current)
      result = voltage / resistance;
  elseif isempty(resistance)
      result = voltage / current;
  elseif isempty(voltage)
      result = current * resistance;
  else
      error('Provide only two values and leave one empty []');
  end
end
```

Example 3: Ohm's law calcul electrical circuit

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      % an electrical circuit.
      % Provide only two values and le
  if isempty(current)
      result = voltage / resistance;
  elseif isempty(resistance)
      result = voltage / current;
  elseif isempty(voltage)
      result = current * resistance;
  else
      error('Provide only two values a
  end
end
```

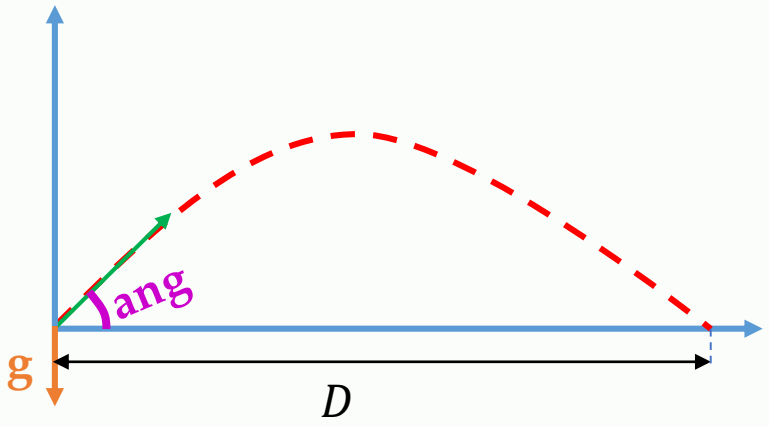
```
>> ohmsLaw([],2,24)

ans =

    12
```

Example 4: Projectile motion calculation

In this example we write a function to calculate the horizontal distance traveled by a projectile given its initial speed and angle. Gravity estimated to be 9.81.



$$D = (speed^2 \times \sin(2 \times angle))/gravity$$

```
function distance = projectileD (speed, angle)

% This function computes the horizontal distance

traveled by a projectile

  gravity = 9.81;

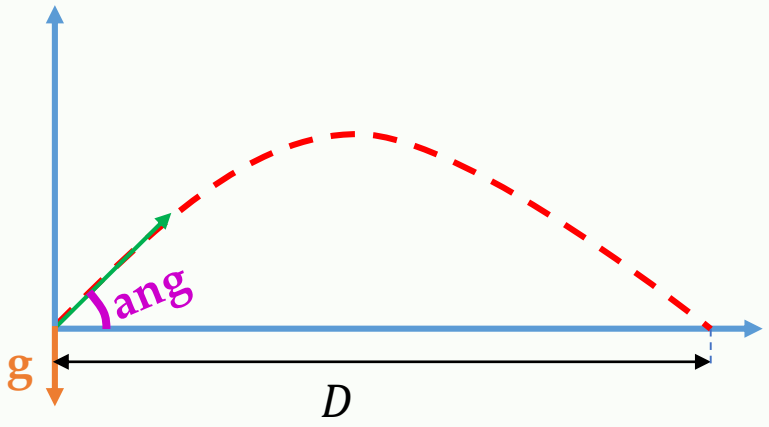
  anglRad = deg2rad(angle);

  distance = (speed^2 * sin(2*anglRad))/gravity;

end
```

Example 4: Projectile motion

In this example we write a function to calculate the horizontal distance traveled by a projectile given its initial speed and angle. Gravity estimated to be 9.81.



$$D = (speed^2 \times \sin(2 \times angle))/gravity$$

```
function distance = pro

% This function compute
traveled by a projectil

  gravity = 9.81;

  anglRad = deg2rad(ang

  distance = (speed^2 *

end
```

```
>> projectileD(30, 45)

ans =

    91.7431
```

Example 5: Factorial of a number

In this example we introduce a recursive function that calculates the factorial of a number.

$$F! = F \times (F-1)!$$

```
function f = facto(n)

      % This function computes the factorial of a number.
  if n<=1
        f = 1;
  else
         f = n * facto(n-1);
  end
end
```

Example 5: Factorial of a nur

In this example we introduce a recursive function that calculates the factorial of a number.

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```
function f = facto(n)

      % This function comput
  if n<=1
       f = 1;
  else
        f = n * facto(n-1);
  end
end
```

```
>> facto(5)

ans =

    120
```

Example 6: Guessing number Game

This function represents a simple game to let the user guess a randomly generated number.

```
function guessingNumber()
% A simple game to guess a randomly generated number between 1 and 100.
number = randi(100);
guess = -1;
attempt = 0;
 while guess ~= number
    guess = input('Enter your guess (1-100): ');
    attempt = attempt +1;
    if guess < number
        disp('Too low!');
    elseif guess > number
        disp('Too heigh!');
    else
    fprintf('Congratulations! you have guessed the number after %d attempts\n', attempt);
    end
 end
end
```

Example 6: Guessing nu

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guess = -1;
attempt = 0;
 while guess ~= number
    guess = input('Enter y
    attempt = attempt +1;
    if guess < number
        disp('Too low!');
    elseif guess > number
        disp('Too heigh!')
    else
    fprintf('Congratulations! yo
    end
 end
end
```

```
>> guessingNumber
Enter your guess (1-100): 60
Too low!
Enter your guess (1-100): 80
Too low!
Enter your guess (1-100): 90
Too low!
Enter your guess (1-100): 95
Too heigh!
Enter your guess (1-100): 91
Congratulations! you are guessed the
number after 5 attempts
```

Practice