# MATLAB for Beginners - Constants, Variables and Expressions

Connect with me: Youtube | LinkedIn | WhatsApp Channel | Web | Facebook | Twitter

## Operators

### Arithmetic Operators

#### Addition (+)

```
x = 5;
y = 10;
z = x + y;
disp(z); % Output: 15
```

#### Subtraction (-)

```
x = 10;
y = 5;
z = x - y;
disp(z); % Output: 5
```

#### Multiplication (*)

```
x = 2;
y = 3;
z = x * y;
disp(z); % Output: 6
```

#### Division (/)

```
x = 6;
y = 3;
z = x / y;
disp(z); % Output: 2
```

#### Exponentiation (^)

```
x = 2;
y = 3;
z = x ^ y;
disp(z); % Output: 8
```

**Modulo (%)**

```
x = 7;
y = 3;
z = mod(x,y);
disp(z); % Output: 1
```

Example: ``` Calculates the area of a rectangle

```
% Define the dimensions of the rectangle
width = 5;
height = 7;

% Calculate the area of the rectangle
area = width * height;

% Display the result
disp('The area of the rectangle is:');
disp(area);
```

Example: Calculate the area of circle with a radius of 5 cm

```
% Define the radius of the circle
r = 5;

% Calculate the area of the circle
area = pi * r^2;

% Display the result
fprintf('The area of the circle with radius %.2f is %.2f.\n', r, area);
```

In this example, we define the radius of the circle as `r=5`. Then, we use the formula for the area of a circle, which is `pi * r^2`, to calculate the area. The `pi` function is a built-in MATLAB function that returns the value of pi (approximately 3.1416). Finally, we use the `fprintf` function to display the result, which is the area of the circle with two decimal places.

You can adjust the value of `r` to calculate the area of a circle with a different radius.

Example: Calculate the circumference of the rectangle

```
% Define the width and height of the rectangle
w = 5;
h = 10;

% Calculate the circumference of the rectangle
circumference = 2 * (w + h);

% Display the result
fprintf('The circumference of the rectangle with width %.2f and height %.2f is
%.2f.\n', w, h, circumference);
```

In this example, we define the width and height of the rectangle as `w=5` and `h=10`, respectively. Then, we use the formula for the circumference of a rectangle, which is `2 * (width + height)`, to calculate the circumference. Finally, we use the `fprintf` function to display the result, which is the circumference of the rectangle with two decimal places.

You can adjust the values of `w` and `h` to calculate the circumference of a rectangle with different dimensions.

### Example: Calculate the area of the triangle

```
% Define the base and height of the triangle
b = 6;
h = 4;

% Calculate the area of the triangle
area = 0.5 * b * h;

% Display the result
fprintf('The area of the triangle with base %.2f and height %.2f is %.2f.\n', b,
h, area);
```

In this example, we define the base and height of the triangle as `b=6` and `h=4`, respectively. Then, we use the formula for the area of a triangle, which is `0.5 * base * height`, to calculate the area. Finally, we use the `fprintf` function to display the result, which is the area of the triangle with two decimal places.

You can adjust the values of `b` and `h` to calculate the area of a triangle with different dimensions.

### Example: Calculate the semiperimeter of a spherical triangle

```
% Define the three sides of the spherical triangle
a = pi/6;  % in radians
b = pi/4;  % in radians
c = pi/3;  % in radians

% Calculate the semiperimeter of the spherical triangle
s = (a + b + c)/2;
```

```
% Display the result
fprintf('The semiperimeter of the spherical triangle with sides %.2f, %.2f, and
%.2f is %.2f.\n', a, b, c, s);
```

In this example, we define the three sides of the spherical triangle as `a=pi/6`, `b=pi/4`, and `c=pi/3`, which are angles measured in radians. Then, we use the semiperimeter formula, which is `s = (a + b + c)/2`, to calculate the semiperimeter of the spherical triangle.

Finally, we use the `fprintf` function to display the result, which is the semiperimeter of the spherical triangle with two decimal places.

You can adjust the values of `a`, `b`, and `c` to calculate the semiperimeter of a different spherical triangle.

### Example: Calculate the area of a triangle using Heron's formula:

```
% Define the lengths of the sides of the triangle
a = 5;
b = 6;
c = 7;

% Calculate the semiperimeter of the triangle
s = (a + b + c)/2;

% Calculate the area of the triangle using Heron's formula
A = sqrt(s * (s - a) * (s - b) * (s - c));

% Display the result
fprintf('The area of the triangle with sides %.2f, %.2f, and %.2f is %.2f.\n', a,
b, c, A);
```

In this example, we define the lengths of the sides of the triangle as `a=5`, `b=6`, and `c=7`. Then, we use the semiperimeter formula, which is `s = (a + b + c)/2`, to calculate the semiperimeter of the triangle. Finally, we use Heron's formula, which is `A = sqrt(s * (s - a) * (s - b) * (s - c))`, to calculate the area of the triangle.

The `sqrt` function is the square root function in MATLAB. The `fprintf` function is used to display the result, which is the area of the triangle with two decimal places.

You can adjust the values of `a`, `b`, and `c` to calculate the area of a different triangle using Heron's formula.

### Example: How to create a plot of a mathematical function

```
% Define the x-values
x = linspace(-10, 10, 100);

% Define the function y = f(x)
y = sin(x);
```

```
% Create a plot of the function
plot(x, y);

% Add labels to the plot
xlabel('x');
ylabel('y');
title('Plot of sin(x)');
```

In this example, we first define a set of x-values using the `linspace` function, which creates an array of 100 equally spaced values between -10 and 10. Then, we define a mathematical function `y = sin(x)` that we want to plot. We use the `plot` function to create a line plot of the function, with the x-values on the horizontal axis and the y-values on the vertical axis. Finally, we add labels to the plot using the `xlabel`, `ylabel`, and `title` functions.

### Example: Generating a random number

```
% Generate a random number between 0 and 1
r = rand();

% Print the random number
disp(r);
```

### Example: Finding the Roots of a Quadratic Equation

```
% Define the coefficients a, b, and c of the quadratic equation ax^2 + bx + c = 0
a = 1;
b = 4;
c = 3;

% Calculate the roots of the quadratic equation using the quadratic formula
x1 = (-b + sqrt(b^2 - 4*a*c)) / (2*a);
x2 = (-b - sqrt(b^2 - 4*a*c)) / (2*a);

% Display the roots
disp(x1);
disp(x2);
```

## factorial

f = factorial(n) returns the product of all positive integers less than or equal to n, where n is a nonnegative integer value. If n is an array, then f contains the factorial of each value of n. The data type and size of f is the same as that of n.

The factorial of n is commonly written in math notation using the exclamation point character as n!. Note that n! is not a valid MATLAB® syntax for calculating the factorial of n. [^1]

## True/False (Mark T for True and F for False)

## Multiple Choice (Select the best answer)

## Exercises

## Review Questions

## References and Bibliography


- [^1]: Factorial of input - MATLAB factorial - MathWorks