Basics

* Anything enclosed in these star bracket (* This is comment *) is a comment.
* For function call square brackets [ ] are used.
* Shift + Enter is used to run a cell .
* A space between two variables or numbers indicates multiplication.
* Use/. and -> to make substitutions in an expression.

In[•]:=
```
1 + 2 x /. x → 2
```
Out[•]=
```
5
```

* Two equal signs == are used to test equality .
* == should be put in Algebric Equaitons .

In[•]:=
```
x = 2;
1 + x == 3
```
Out[•]=
```
True
```

In[•]:=
```
y y + 2 y + 1 == 0
```
Out[•]=

$$1 + 2\,y + y^2 == 0$$

* Method name start with capital letters and generally it is black color .
* Variables are shown in blue colors .
* Do not put ; at the end of expression to evaluate and print the output.
* E is build in exponential constant .
* https : // www . wolfram . com/language/fast - introduction - for - math - students/en/mathematical - typesetting/
* https : // www . wolfram . com/language/fast - introduction - for - math - students/en
* https : // www . wolfram . com/language/fast - introduction - for - math - students/en/notebook - documents/

Fraction

Use CTRL+/ to enter fractions

In[•]:=
```
1/4 + 5/6
```
Out[•]=

$$\frac{13}{12}$$

Array

Array is initiated with curly brackets {}.
Index start from 1.
To access elements double squared brackets [[index]] is used.

```
In[•]:= a = {10, 5, 6, 1};
        a[[1]]
Out[•]=
        10
```

Frequently used built in functions

```
In[•]:= GCD[10, 5, 15]
Out[•]=
        5

In[•]:= Range[10, 20]
Out[•]=
        {10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20}

In[6]:= Table[x^2, {x, 1, 10}] (* to generate a sequence*)
Out[6]= {1, 4, 9, 16, 25, 36, 49, 64, 81, 100}

In[•]:= Together[a/b + c/d]
Out[•]=
        b c + a d
        ---------
          b d

        N[2200 / 3, 10] (* Used for numerical Approximation upto 10 significant figures*)
Out[•]=
        733.3333333

In[•]:= ScientificForm[0.0000025517]
Out[•]//ScientificForm=
        2.5517 × 10^-6

In[•]:= Clear[x] (* This is used to clear assigned values of variable x*)

        Solve[y y + 2 y + 1 == 0, y] (* Exact Solution*)
Out[•]=
        {{y → -1}, {y → -1}}

In[•]:= NSolve[7 y y + 3 y - 5 == 0, y] (* Numerical solution*)
Out[•]=
        {{y → -1.08618}, {y → 0.657611}}
```

```
In[•]:= Clear[{x, y}];
        Solve[{x x + 5 == y, 7 x - 5 == y}, {x, y}] (*To solve a system of eqautions.*)
Out[•]=
        {{x → 2, y → 9}, {x → 5, y → 30}}
```

Trigonometry

```
In[•]:= Clear[{x}]
        Sin[x] / Cos[x] == Tan[x]
Out[•]=
        True

In[•]:= ArcTan[1]
Out[•]=
        π
        —
        4

In[•]:= Sin[π / 4] * Sin[Pi / 4] (* Type esc+pi+esc for this character *)
Out[•]=
        1
        —
        2

In[•]:= Solve[Cos[x]^2 + Sin[x]^2 == x]
Out[•]=
        {{x → 1}}
```

Derivative

```
In[10]:= Clear[{x, y}]

In[11]:= D[x^6 + 5 x y, x] (*This is partial derivative*)
Out[11]=
         6 x^5 + 5 y

         D[x^6 + 5 x * y, x, y] (*Double derivative first with x then with y*)
Out[13]=
         5

In[•]:= D[x^6, {x, 3}]
Out[•]=
        120 x^3

In[•]:= Sin'[x] (*You can use upper dash (') also *)
Out[•]=
        Cos[x]
```

Integration

In[1]:=
```
Integrate[x^2, x]
```

Out[1]=
$$\frac{x^3}{3}$$

In[3]:=
```
Integrate[x^2, {x, -1, 1}]
```

Out[3]=
$$\frac{2}{3}$$

$$\int 4\,x\text{^}3\,dx$$ (*Type ESC intt ESC for a fillable mathematical expression: *)

Out[2]=
$$x^4$$

In[4]:=
$$\int_0^{\pi} \text{Sin}[x]\,dx$$ (*ESC dintt ESC*)

Out[4]=
$$2$$

In[5]:=
```
NIntegrate[x^3 Sin[x] + 2 Log[3 x]^2, {x, 0, Pi}]
```

Out[5]=
```
28.1531
```

User defined funcitons

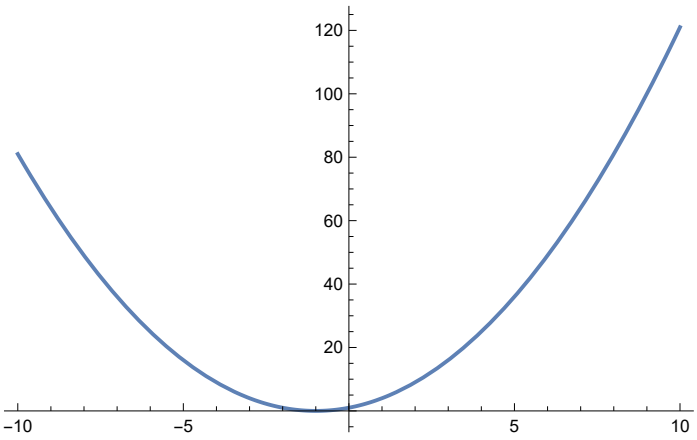
In[•]:=
```
f[x_] := x^6 + 2 x + 1;
f'[x]
```

Out[•]=
$$2 + 6\,x^5$$

Plotting

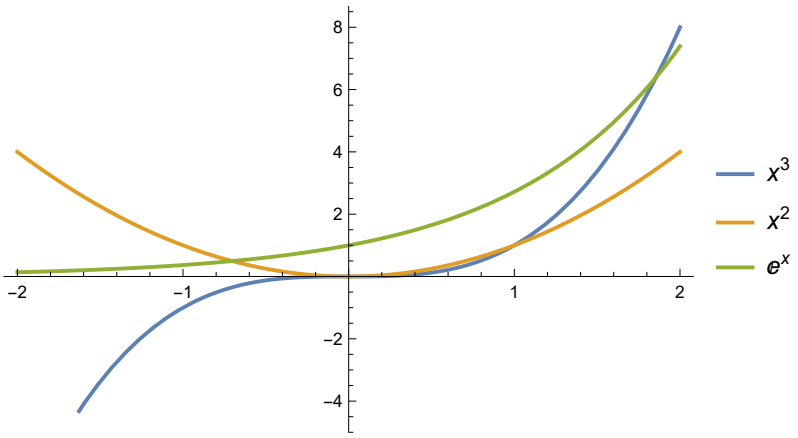
In[•]:=
```
Plot[x^2 + 2 x + 1, {x, -10, 10}]
```

Out[•]=



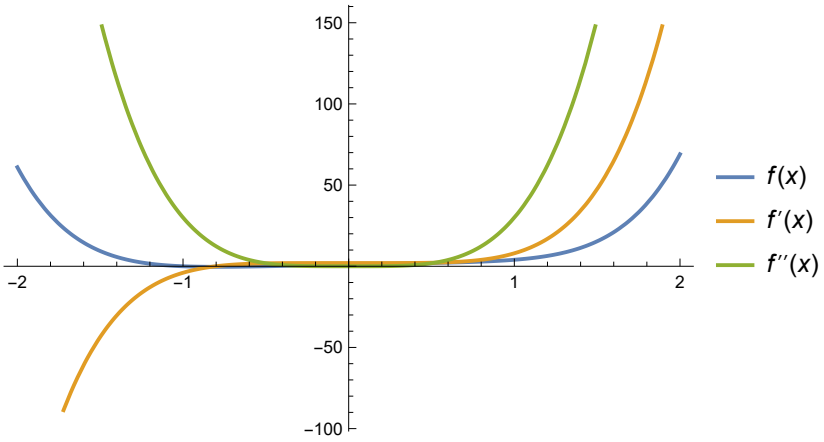
In[•]:=
```
Plot[{x^3, x^2, E^x}, {x, -2, 2}, PlotLegends → "Expressions"]
```

Out[•]=



In[•]:=
```
Plot[{f[x], f'[x], f''[x]}, {x, -2, 2}, PlotLegends → "Expressions"]
```

Out[•]=



In[•]:=
```
Show[{Plot[x^2 + 2, {x, -3, 3}], RegionPlot[2 x > y - 3, {x, -3, 3}, {y, 0, 9}]}]
```

Out[•]=