9/9/2022 : BASICS OF MATHEMATICA

In[ ]:= **2 + 3**

Out[ ]= 5

In[ ]:= **6^3**

Out[ ]= 216

In[ ]:= **23 * 21**

Out[ ]= 483

In[ ]:= **25 / 4**

Out[ ]= $\frac{25}{4}$

In[ ]:= **25 / 5**

Out[ ]= 5

In[ ]:= **999 - 678**

Out[ ]= 321

In[ ]:= **2 × 3**

Out[ ]= 6

In[ ]:= **5 \2**

... Syntax: 3 octal digits are required after \ to construct an 8–bit character.

... Syntax: "5 \2" is incomplete; more input is needed.

In[ ]:= **20 // 3**

Out[ ]= 3[20]

times[3, 4]

Out[ ]= times[3, 4]

In[ ]:= **Divide[45, 5]**

Out[ ]= 9

In[•]:= 2.5 * 5.2

Out[•]= 13.

In[•]:= 2. / 3.

Out[•]= 0.666667

In[•]:= 2 / 3

Out[•]= $\frac{2}{3}$

In[•]:= Plus[5, 7]

Out[•]= 12

In[•]:= Subtract[45, 7]

Out[•]= 38

In[•]:= A * B

Out[•]= A B

Out[•]= $\frac{A^2\ B}{2}$

// MATHEMATICA ALLOWS BOTH NUMERIC AND CONSTANT CALCULATION. IN MATLAB, THE VARIABLE SHOULD BE DECLARED FIRST AND THEN USED.

In[•]:= 2 * A

Out[•]= 2 A

// EVERY INPUT COMMAND IN MATHEMATICA IS INPUT USING THE BRACKTETS

// COMMAND FUNCTION HAS FIRST LETTER CAPITAL IN ITS DEFNITION / DECLARATION

In[•]:= Solve[2x+1==0,x]

Solve[2 * x + 1 == 0, x]

$\{\{x \to -\frac{1}{2}\}\}$

In[•]:=
```
Solve[{2x+3y==0, 3x+4y==0}, {
 {{x, y}]
```
```
{{2*x + 3*y == 0, 3*x + 4*y == 0}, {{{x, y}}}}
```

Out[•]= $\{\{2\,x+3\,y==0,\,3\,x+4\,y==0\},\{\{\{x,\,y\}\}\}\}$

In[•]:=
```
? SQRT[]
```

Out[•]=
```
Missing[UnknownSymbol, SQRT[]          ]
```

- ;- FOR COMMENTS (**) SHOWS THE DECIMAL REPRESTATION FOR THE GIVEN EXCEPTion

In[•]:=
```
 = n[PI, 6]
```

In[•]:=
```
Sqrt[400]
```

Out[•]= 20

In[•]:=
```
N[%%]
```

Out[•]= 2.

In[•]:=
```
D[y & 2, y^95, 3 + 12]
```

... General: y^{95} is not a valid variable.

Out[•]= $\partial_{y^{95},15}\left(2\ \left(y\ \&\right)\right)$

In[•]:=
```
Floor[2.3]
```

In[•]:=
```
Ceiling[5.6]
```

In[•]:=
```
Sin[30]
 // %% sign jumps to the number of given to amphasend { &} or any variable / number specified.
```

Out[•]= Sin[30]

In[•]:=
```
[Sin[60]] »
```
```
Sin[60*Degree]
```

Out[•]= $\frac{\sqrt{3}}{2}$

```
N[tan[45]]
```

Out[•]= tan[45.]

In[ ]:=
```
tan[45] »
Tan[45 * Degree]
```

1

In[ ]:=
```
num = {1, 2, 3, A, B, C, D}
```

Out[ ]=
```
{1, 2, 3, A, B, C, D}
```

In[ ]:=
```
Length[num]
```

Out[ ]=
```
7
```

// MatrixForm : used to print a given 2 d array into proper matrix form

In[ ]:=
```
m = {{1, 2, 3}, {2, 6, 4}}
m
```

Out[ ]=
```
{{1, 2, 3}, {2, 6, 4}}
```

Out[ ]=
```
{{1, 2, 3}, {2, 6, 4}}
```

In[ ]:=
```
m // MatrixForm
```

a

Out[ ]//MatrixForm=

$$\begin{pmatrix} 1 & 2 & 3 \\ 2 & 6 & 4 \end{pmatrix}$$

/. REPLACEMENT OPERATOR

In[ ]:=
```
X + Y + 4
```

Out[ ]=
```
4 + X + Y
```

In[ ]:=
```
x + y + 4 /. {x → 4 , y → 7}
```

Out[ ]=
```
15
```

MATHEMATICA :: FASTER ANSWERS,
ACCURATE ANSWERS AND CHANGE THE DESIRED PRECISION FOR A SOLUTION OF THE QUESTION

DEFINING FUNCTIONS → f[x_] := x^2 where f is the name of the function.

In[ ]:=
```
Clear[x]
```

In[ ]:=
```
f[x_] := x^3
```

In[ ]:=
```
z = f[4 x + 2 x^3 + 4 * x^2]
```

Out[ ]=
$$\left(4\,x + 4\,x^2 + 2\,x^3\right)^3$$

In[ ]:=
```
N[z]
```

Out[ ]=
$$\left(4.\,x + 4.\,x^2 + 2.\,x^3\right)^3$$

In[•]:=
```
Expand[(4. x + 4. x^2 + 2. x^3)^3]
```
Out[•]= $64.\,x^3 + 192.\,x^4 + 288.\,x^5 + 256.\,x^6 + 144.\,x^7 + 48.\,x^8 + 8.\,x^9$

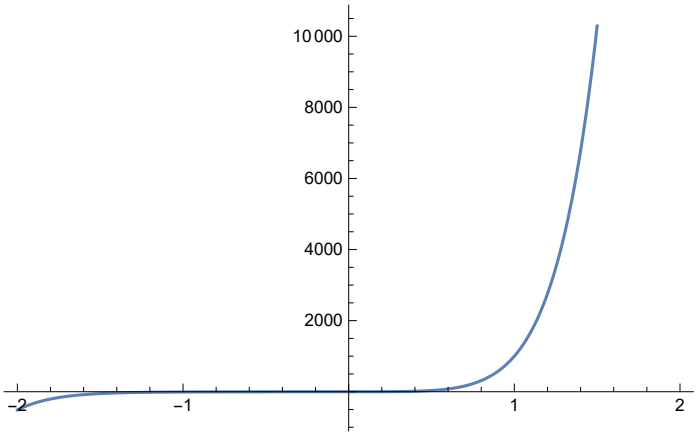
Expand[] simplifies the whole polynomial equation

In[•]:=
```
Expand[z]
```
Out[•]= $64\,x^3 + 192\,x^4 + 288\,x^5 + 256\,x^6 + 144\,x^7 + 48\,x^8 + 8\,x^9$

ClearAll : clears all the values stored in the created Variables

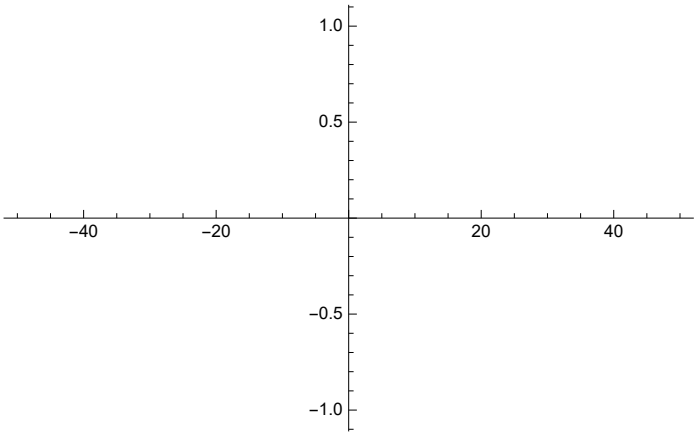
```
Plot[z, {x, -2, 2}]
```

Out[•]=

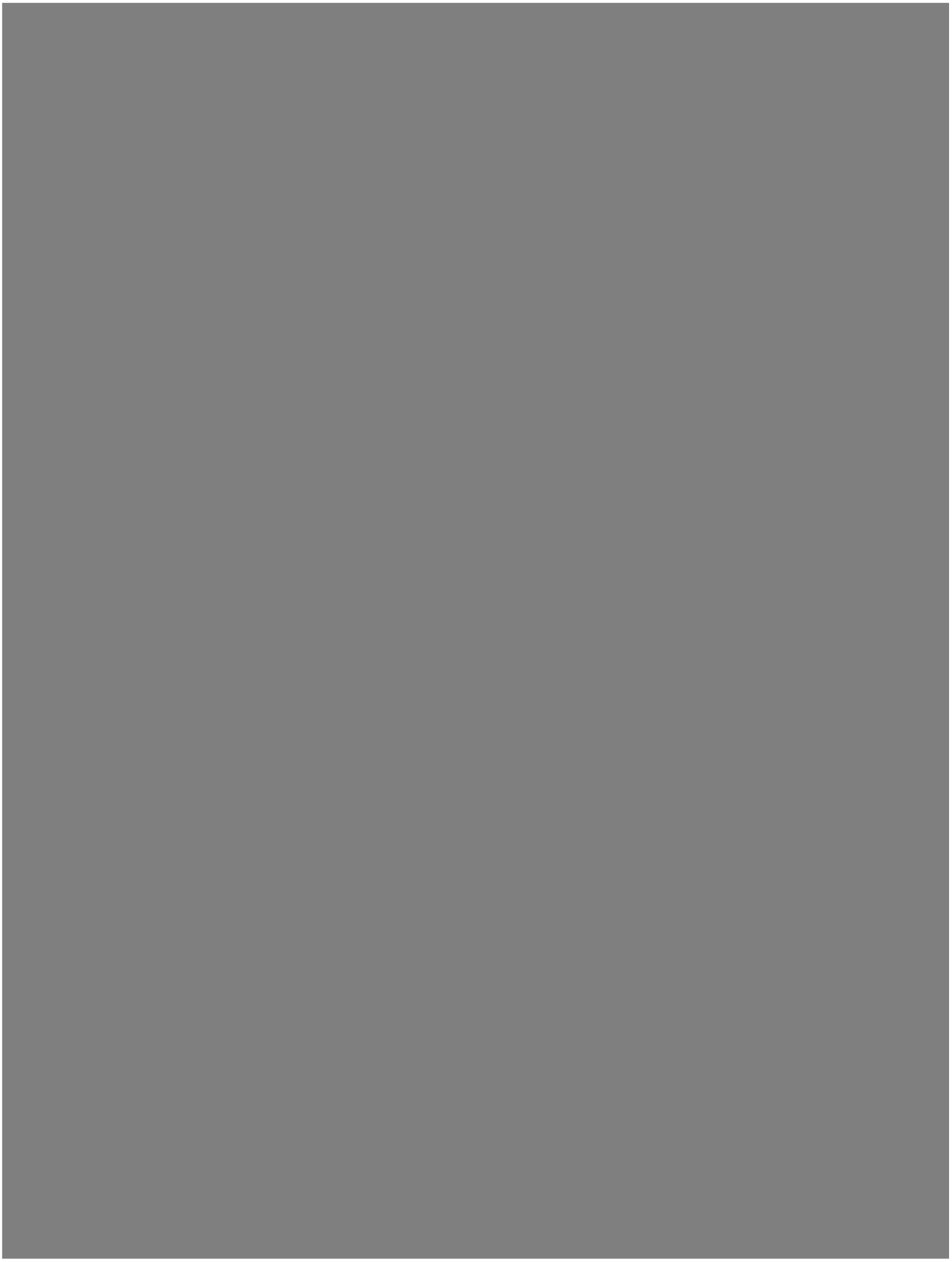


In[•]:=
```
f[m_] := m^3
mm = f[2 x^2 - 3 x + 5]
Plot[mm, {m, -50, 50}]
```
Out[•]= $(5 - 3\,x + 2\,x^2)^3$

Out[•]=



In[ ]:=  **SUM(23+34)**



In[ ]:= 2300/23+234-23

In[ ]:= 23.433-22*23/23