corrigé TP 1

```
> restart;
> 1639/18+78;
```

$$\frac{3043}{18}$$

```
> whattype(%);
```

fraction

```
> evalf(%%);
```

169.0555556

```
> whattype(%);
```

float

```
> 100!;
>
```

933262154439441526816992388562667004907159682643816214685929638952175999\
9932299156089414639761565182862536979208272237582511852109168640000000\
0000000000000000

```
> length(%);
```

158

```
> whattype(%%);
```

integer

```
> 170!;
```

725741561530799896739672821112926311471699168129645137654357779890056184\
3401706157852350749242617459511490991237838520776666022565442753025328\
9007732075109024004302800582956039666125996582571043985582942575689663 1\
3439612262571094946806711205568880457193340212661452800000000000000000 0\
0000000000000000000000

```
> 2^(2^10);
```

179769313486231590772930519078902473361797697894230657273430081157732675\
8055009631327084773224075360211201138798713933576587897688144166224928\
4743063947412437776789342486548527630221960124609411945308295208500576 8\
8381506823424628814739131105408272371633505106845862982399472459384797 1\
6304835356329624224137216

```
> 2^(2^100);
Error, numeric exception: overflow
```

```
> sqrt(2);
```

$$\sqrt{2}$$

```
> whattype(%);
```

^

```
> Pi;
```

π

```
> evalf(%);
```

3.141592654

```
> evalf(Pi,200);
```

3.14159265358979323846264338327950288419716939937510582097494459230781640628620899862803482534211706798214808651328230664709384460955058223172535940812848111745028410270193852110555964462294895493038

```
> sqrt(-2);
```

$$\sqrt{2}\,I$$

```
> evalf(%);
```

$$1.414213562\,I$$

```
> sin(Pi/4);
```

$$\frac{\sqrt{2}}{2}$$

```
> sin(0.2);
```

$$0.1986693308$$

```
> Digits:=3;
```

$$Digits := 3$$

```
> sin(0.2);
```

$$0.199$$

Exercices 1.2

```
> ((16*7^3)-2*sqrt(2))/(4-10/3);
```

$$8232 - 3\sqrt{2}$$

```
> evalf(%,20);
```

$$8227.7573593128807149$$

```
> 1/2*ln(2*sqrt(3)/5);
```

$$\frac{1}{2}\ln\left(\frac{2\sqrt{3}}{5}\right)$$

```
> evalf(%);
```

$$-0.1834922936$$

```
> exp(2*I*Pi/6);
```

$$\frac{1}{2}+\frac{1}{2}\,I\sqrt{3}$$

```
> evalf(%);
```

$$0.5000000000 + 0.8660254040\,I$$

Exercice 2.2

```
> restart:
> x:=Pi;y:=sqrt(3);
```

$$x := \pi$$
$$y := \sqrt{3}$$

```
> z:=x;x:=y;y:=z;
```

$$z := \pi$$
$$x := \sqrt{3}$$
$$y := \pi$$

2.3 Expressions

```
> restart:e1:=(1+x)^2*(2*x+1);
```

$$e1 := (1+x)^2\,(2\,x+1)$$

```
> expand(e1);
```

$$4\,x+1+5\,x^2+2\,x^3$$

```
> factor(%);
```

$$(1+x)^2\,(2\,x+1)$$

```
> e2:=x^2+13/6*x-5/6;
```

$$e2 := x^2+\frac{13}{6}\,x-\frac{5}{6}$$

```
> factor(e2);
```

$$\frac{(2\,x+5)\,(3\,x-1)}{6}$$

```
> poly:=x^5-2*x^4-x^3+2*x^2+x-2;
```

$$poly := x^5-2\,x^4-x^3+2\,x^2+x-2$$

```
> eval(poly,x=2);
```

$$0$$

```
> eval(poly,x=Pi);
```

$$\pi^5-2\,\pi^4-\pi^3+2\,\pi^2+\pi-2$$

```
> evalf(%);
```

$$101.0760276$$

```
> solve(poly,x);
```

$$2,\ -\frac{\sqrt{2+2\,I\sqrt{3}}}{2},\ \frac{\sqrt{2+2\,I\sqrt{3}}}{2},\ -\frac{\sqrt{2-2\,I\sqrt{3}}}{2},\ \frac{\sqrt{2-2\,I\sqrt{3}}}{2}$$

```
> fsolve(poly,x);
```

$$2.$$

```
> fsolve(poly,x,complex);
```

$$-0.8660254038-0.5000000000\,I,\ -0.8660254038+0.5000000000\,I,$$
$$0.8660254038-0.5000000000\,I,\ 0.8660254038+0.5000000000\,I,\ 2.$$

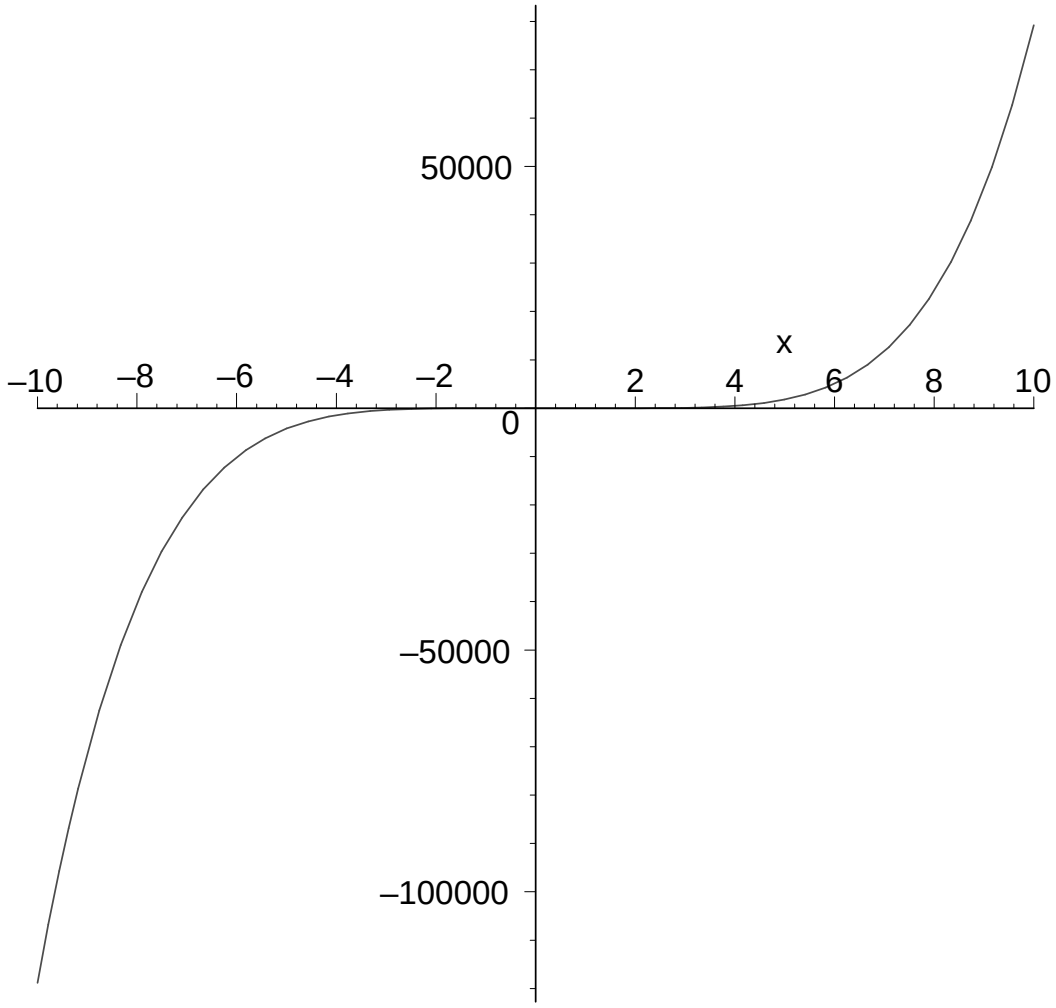
```
> fsolve({poly},{x});
```

$$\{x=2.\}$$

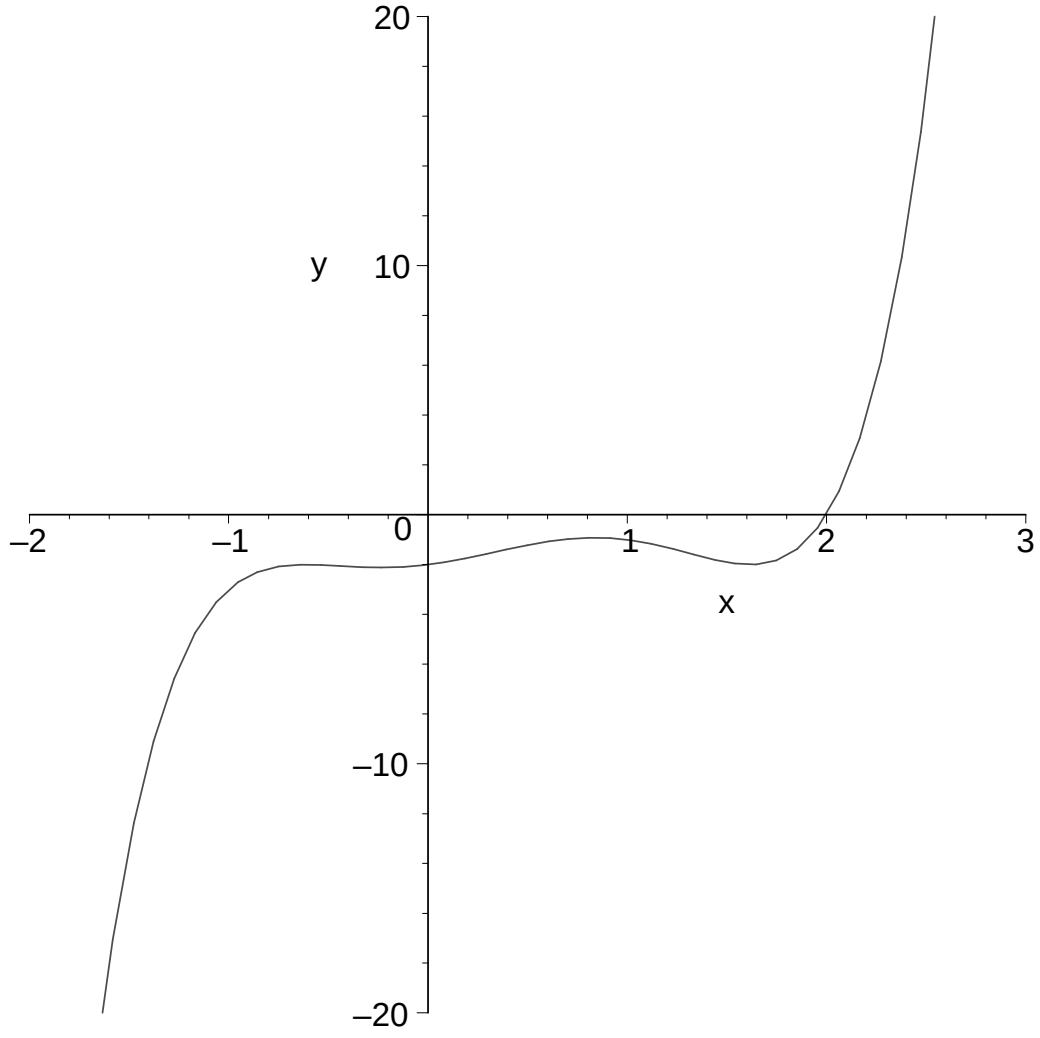
2.4 commandes graphiques

```
> with(plots):
Warning, the name changecoords has been redefined
```

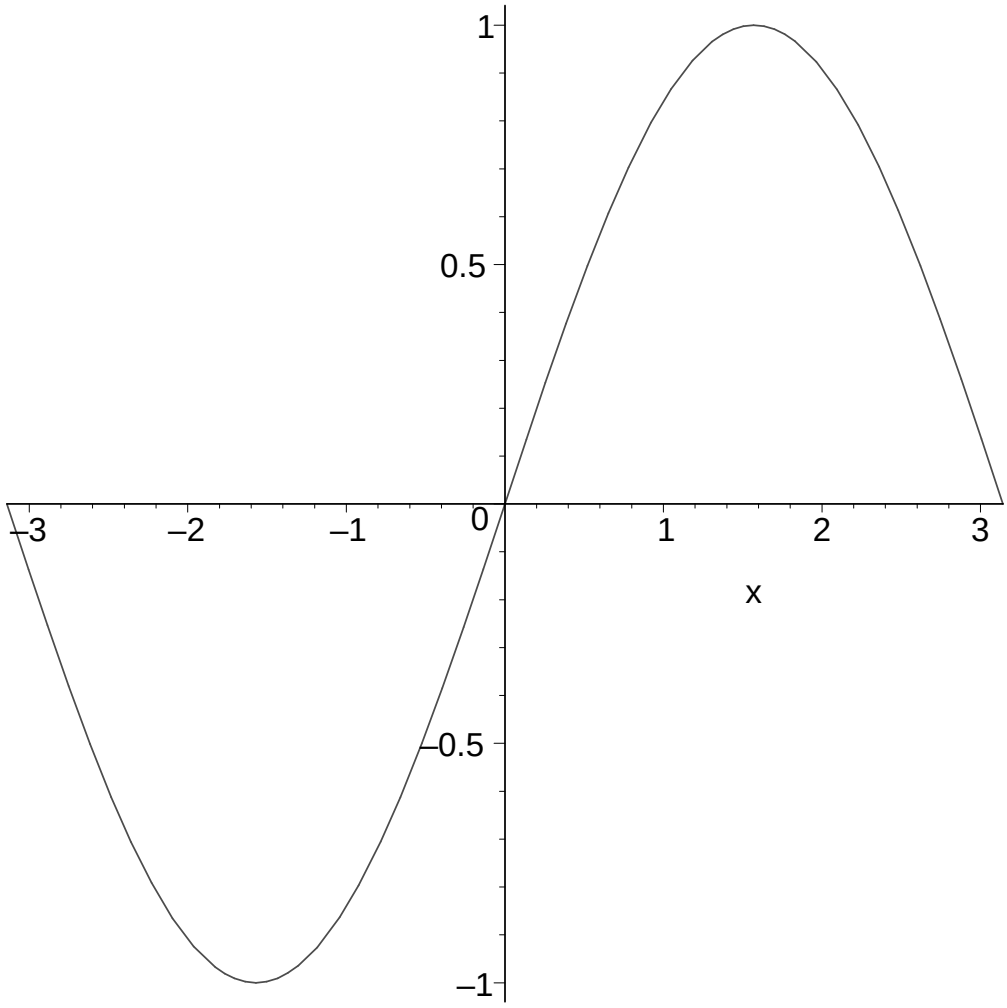
```
> plot(poly(x),x=-10..10);
```



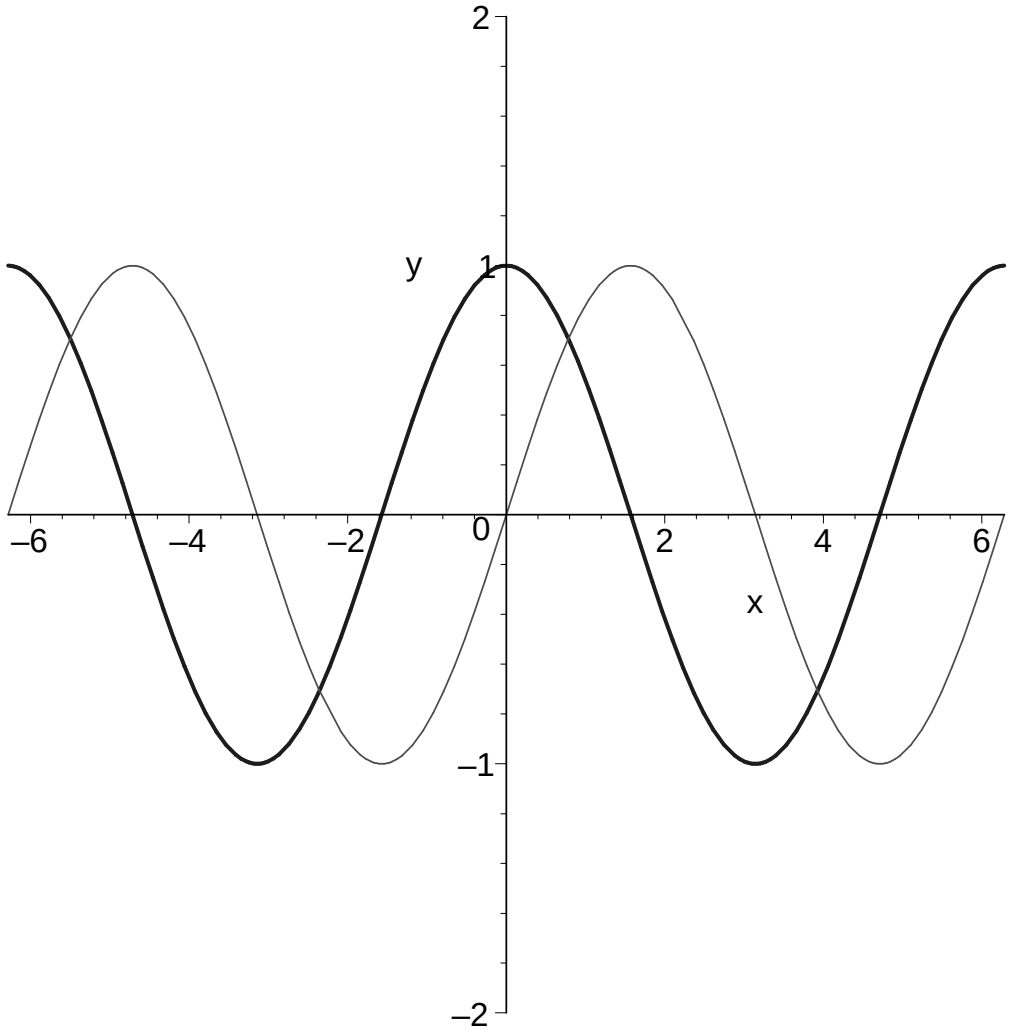

```
> plot(poly(x),x=-2..3,y=-20..20);
```



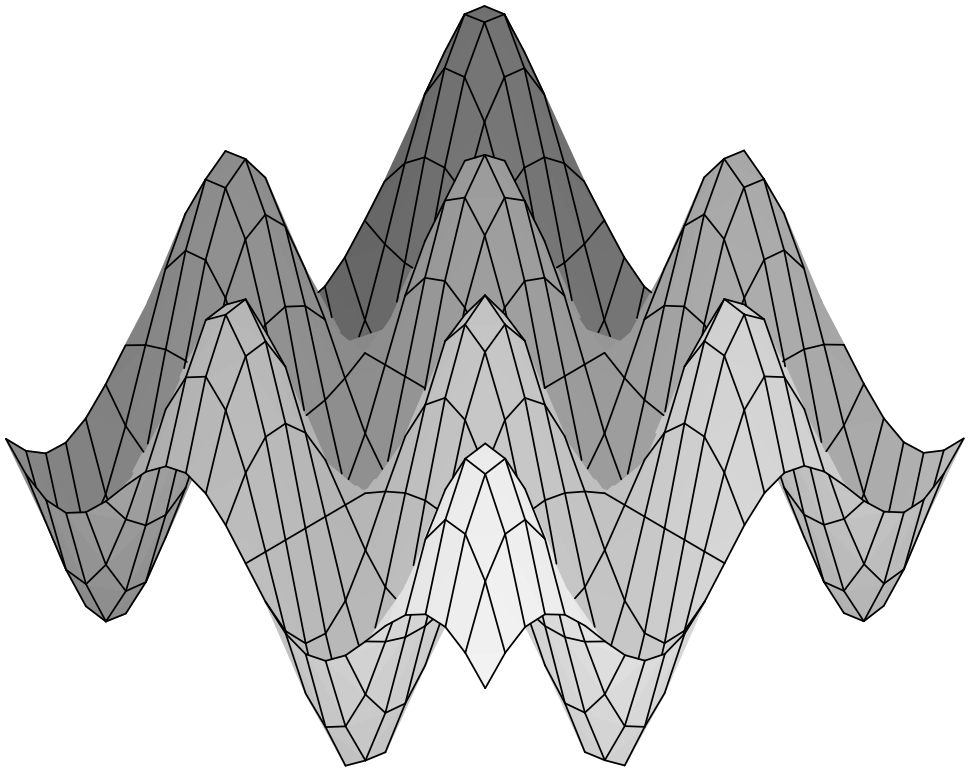

```
> plot(sin(x),x=-Pi..Pi);
```




```
> plot([sin(x),cos(x)],x=-2*Pi..2*Pi,y=-2..2,color=[red,blue],thic
  kness=[2,3]);
```




```
> plot3d(sin(x)*sin(y),x=-6..6,y=-6..6);
```



section 3 algèbre linéaire

```
> restart;with(linalg):
Warning, the protected names norm and trace have been redefined and unprotected
```

Warning, the protected names norm and trace have been redefined and unprotected

```
> A:=matrix(3,3,[1,2,3,4,5,6,7,8,9]);
```

$$A := \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

```
> transpose(A);
```

$$\begin{bmatrix} 1 & 4 & 7 \\ 2 & 5 & 8 \\ 3 & 6 & 9 \end{bmatrix}$$

```
> B:=matrix(3,3,[1,0,0,0,1,0,0,0,1]);
```

$$B := \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

```
> A+B;
```

$$A + B$$

```
> evalm(A+B);
```

$$\begin{bmatrix} 2 & 2 & 3 \\ 4 & 6 & 6 \\ 7 & 8 & 10 \end{bmatrix}$$

```
> C:=A+B;
```

$$C := A + B$$

```
> evalm(A&*B);
```

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

```
> evalm(A&*C);
```

$$\begin{bmatrix} 31 & 38 & 45 \\ 70 & 86 & 102 \\ 109 & 134 & 159 \end{bmatrix}$$

Section 4 : expressions booléennes

```
> evalb(0=1);
```

false

```
>
> evalb(2+2=4);
```

true

```
> restart;
> evalb(a=1);
```

false

```
> a:=1;
```

$$a := 1$$

```
> evalb(a=1);
```

true

```
> restart;
> true and true;
```

true

```
> true and false;
```

false

```
> true or false;
```

true

5. Exercices

```
> S:=sum(4*i+1,i=1..n);
```

$$S := 2\,(n+1)^2 - n - 2$$

```
> factor(S);
```

$$n\,(2\,n+3)$$

```
> restart;
> V:=matrix(1,3,[a,b,c]);W:=matrix(3,1,[1,2,3]);
```

$$V := [a \quad b \quad c]$$

$$W := \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$$

V est de taille 1x3, et W est de taille 3x1. Donc le produit VW est possible, il est de dimension 1x1 ; le produit WV est possible, il est de dimension 3x3

```
> evalm(V&*W);
```

$$[a + 2\,b + 3\,c]$$

```
> evalm(W&*V);
```

$$\begin{bmatrix} a & b & c \\ 2\,a & 2\,b & 2\,c \\ 3\,a & 3\,b & 3\,c \end{bmatrix}$$

```
>
```