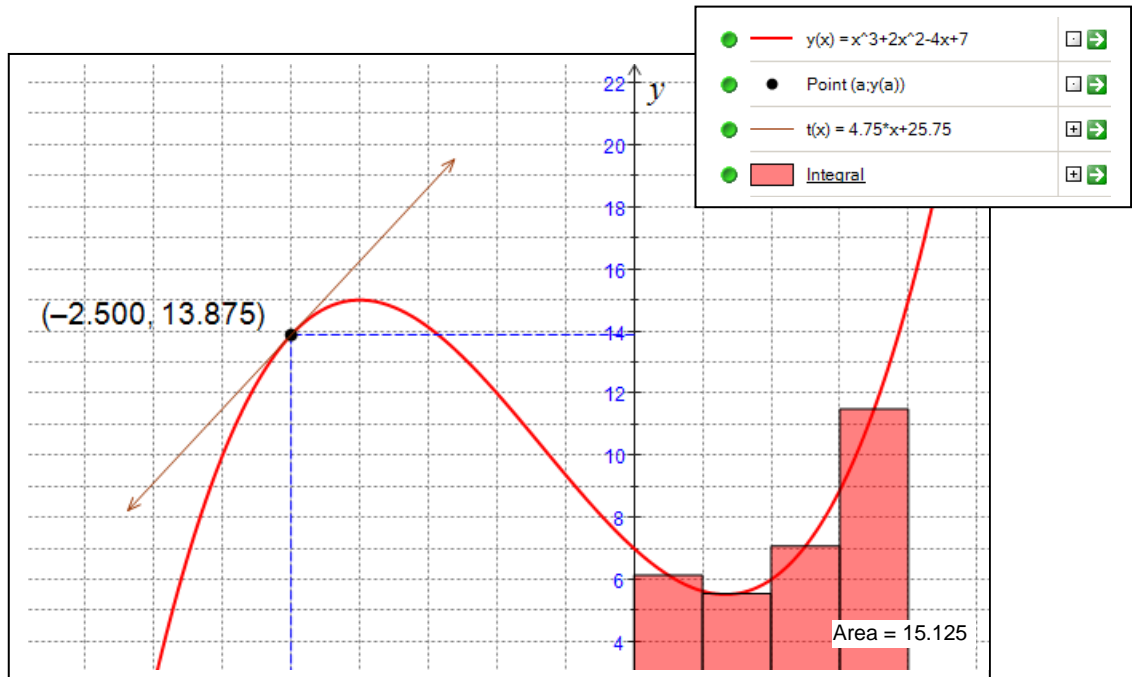


Graphe Easy

MANUAL



To find	GE command	example
table of values	points(x_{\min} , x_{\max} , x_{step} , $f(x)$, $g(x)$)	points(0,10,1, $y(x)$)
derivative function	derive($f(x)$)	derive($y(x)$)
definite integral	integral($f_{\text{lower}}(x)$, $f_{\text{higher}}(x)$, a , b)	integral(0, $y(x)$,-2,2)
derivate value at a point	der($f(x)$, a)	der($y(x)$,2)
equation of tangent at a point	tangent($f(x)$, a)	tangent($y(x)$,2)
equation of normal at a point	normal($f(x)$, a)	normal($y(x)$,2)
x value at first TP:	extrx-($f(x)$, a , b)	extrx-($y(x)$, a , b)
x value at last TP:	extrx+($f(x)$, a , b)	extrx+($y(x)$, a , b)
x values list for all TPs:	extrx($f(x)$, a , b)	extrx($y(x)$, a , b)
y value at min/max:	minF, maxF($f(x)$, a , b)	minF, maxF($y(x)$, a , b)
when $f(x)$ gives y	pointx($f(x)$, y , a , b)	pointx($f(x)$, y , a , b),
x at first intersection	interx-($f(x)$, $g(x)$, a , b)	interx-($f(x)$, $g(x)$, a , b)
x at last intersection	interx+($f(x)$, $g(x)$, a , b)	interx+($f(x)$, $g(x)$, a , b)
x list all intersections	interx($f(x)$, $g(x)$, a , b)	interx($f(x)$, $g(x)$, a , b)
nth biggest root:	index(pointx($f(x)$,0,-10,10), n -1)	index(pointx($f(x)$,0,-10,10), n -1)
nth biggest TPx:	index(extrx($f(x)$,-10,10), m -1)	index(extrx($f(x)$,-10,10), m -1)
nth biggest TPy:	f(TPx(n))	f(TPx(n))

Mathematical expressions

By Olivier ANSQUER

All the expressions and calculations in Graphe Easy are written as in a graphic calculator.

1. Elements of expressions

a. Numbers

They are written in the standard way. Use the dot to separate the integer part from the decimal part.

Ex : -1.25, +.25, 123

A scientific notation is available.

Ex : $0.000001 = 1e-6$, $10\ 000\ 000 = 1e7$

b. Operators

[Click here](#) to get the whole operators list.

c. Standard functions

They are the functions you can use in all the documents.

[Click here](#) to get the whole standard functions list.

d. Standard constants

They are the constants you can use in all the calculations..

[Click here](#) to get the whole standard constants list.

e. User's defined functions

Graphe Easy allows you to define customized functions.

[Click here](#) to know how to create or to modify those functions. You can use them as well as the standard functions but do not forget to respect the case of the letters.

f. User's defined constants

Graphe Easy allows you to define customized constants.

[Click here](#) to know how to create or to modify those constants.

To use them, just enter their name but do not forget to respect the case of the letters.

g. User's defined parameters

Graphe Easy allows you to define customized parameters.

[Click here](#) to know how to create or to modify those parameters.

To use them, just enter their name but do not forget to respect the case of the letters.

h. Variables

To use the variables, just enter their name.

Example : If you enter the equation of a curve as $y(x) = f(x)$, you can use the variable "x" in the expression of "f(x)".

It's impossible to use a variable if a parameter or a constant has the same name.

2. Examples

Description	Mathematical notation	Graphe Easy notation
Multiplication	$A \times B$	$A * B$
Division	$\frac{A}{B}$	A / B
Square	A^2	$A \wedge 2$ ou A^2
Power	A^B	$A \wedge B$
Square root	\sqrt{A}	sqrt(A) or rc(A)
One variable function	$\cos x$	cos(x) or cos x
Several variables function	$\min(2,1,3)$	min(2,1,3)
Factorial	$A!$	fact(A) ou fact A
Product	$\prod_{P=3}^{11} (1 - P^2)$	prod(1-x ² ,3,11)
Sum	$\sum_{P=3}^{11} (1 - P^2)$	sum(1-x ² ,3,11)

Operators

By Olivier ANSQUER

List of available operators

Here is the list (in priority order) of all available operators you can use in your calculations and mathematical expressions :

Operator	Description	Example
AND	Test if two expressions are different from 0. Useful to get it with the IF function.	if(x>0 and x<4,1,0)
OR	Test if one or both expressions are different from 0. Useful to get it with the IF function.	if(x<=0 or x>=4,0,1)
<, <=, <>, =, >=, >	You can compare numbers with these operators. It returns 1 when it is true and 0 else.	1 < 2, x >= 4, x <> 0
+	To add two numbers.	x + 4, x + -1, 1 + 0

-	To subtract a number from another one.	$x - 4, x - -1, 1 - 0$
*	To multiply two numbers.	$x * 4, x * -1, 1 * 0$
/	To divide a number by another one.	$x / 4, x / -1, 0 / 1$
!	Returns 1 if the number is 0 and 0 else. Useful to test the opposite of a condition.	$!4 = 0, !0 = 1$
%	Returns the rest of a division between two integers. If the first number is negative, the result is negative.	$9 \% 4 = 1, 10 \% -4 = 2$
^	Power of a number.	$2 ^ 4 = 16, 27^{(1/3)} = 3$
²	Square of a number.	$2^2 = 4, 3^2 = 9$

Standard functions

By Olivier ANSQUER

1. Available helps to use standard functions

In most cases, when you want to enter or to use a standard function, you can be helped different ways :

a. The whole functions list

To access the whole functions list easily, just do a right click to display the contextual menu and click on the sub-menu "Insert function".
you will be finding all the functions sorted by categories. If you leave the cursor for a few seconds over the name of a function, a brief description appears in a pop-up. If you click on the name of a function, its name is pasted and a pop-up is displayed to help you to use this function

b. Get help directly from the name of the function

If the name of the function is entered, you can select it and press the F1 key : a brief description appears in a pop-up. This help is also available by a right-click to display the contextual menu followed by a click on "Current selection help".

2. The whole functions list

a. Standard category

Name	Numbers of variables	Description	Example(s)
Abs	1	Absolute value function	$Abs(-1.25) = 1.25, Abs(2) = 2$
		Returns the smallest number with a specified number of decimal greater	$Ceil(-1.256,2) = -1.25, Ceil$

Ceil	2	than or equal to the specified number	$(1.2569,3) = 1.257$
Exp	1	Exponential function	$\exp(0)$, $\exp 0.5$
Fact	1	Factorial function	$\text{fact}(0) = 1$, $\text{fact } 4 = 24$
Floor	2	Returns the largest number with a specified number of decimal less than or equal to the specified number	$\text{Floor}(-1.256,2) = -1.26$, $\text{Floor}(1.2569,3) = 1.256$
Int	1	Integer part function	$\text{int}(1.25) = 1$, $\text{int } 1.99 = 1$
Ki	2	This function can be used only in an expression containing a defined variable. It returns 1 if the variable value is between the two numbers.	$\text{ki}(2,4)$
Sqrt	1	Square root function	$\text{sqrt}(2)$, $\text{rc } 4$
Ln	1	Naperian logarithm function	$\ln(1)$, $\ln 2$
Log	1	Common logarithm function	$\log(1)$, $\log 2$
Product	3	Product function	$\text{prod}(x^2,1,3) = 1^2 * 2^2 * 3^2$
Rand	1	Random function. Returns a number between 0 and the parameter.	$\text{rand}(1)$, $\text{rand } 10$
Round	2	Returns a number rounded to a specified number of decimal places	$\text{Round}(-1.256,2) = -1.26$, $\text{Round}(1.2569,3) = 1.257$
Sign	1	Sign function. Returns the sign of a number (-1 if it is negative, +1 else).	$\text{sign}(0)$, $\text{sign } -1$
Sum	1	Sum function	$\text{sum}(x^2,1,3) = 1^2 + 2^2 + 3^2$

b. Conversion category

Name	Number of parameters	Description	Examples
DegToGrad	1	Convert degrees to grades.	$\text{DegToGrad}(90)$, $\text{DegToGrad } 180$
DegToRad	1	Convert degrees to radians.	$\text{DegToRad}(90)$, $\text{DegToRad } 180$
GradToDeg	1	Convert grades to degrees.	$\text{GradToDeg}(100)$, $\text{GradToDeg } 200$
GradToRad	1	Convert grades to radians.	$\text{GradToRad}(100)$, $\text{GradToRad } 200$

RadToDeg	1	Convert radians to degrees.	RadToDeg(pi/2), RadToDeg pi
RadToGrad	1	Convert radians to grades.	RadToGrad(pi/2), RadToGrad pi

c. Derivative category

Name	Number of parameters	Description	Examples
Derive	1	Returns the derivative of an expression	derive(cos(x)+1)
Der	2	Returns the derivative number of an expression at a point	der(cos(x)+1,2)
Tangent	2	Returns the tangent line of a curve at a point	tangent(cos x,1)
Normal	2	Returns the normal line of a curve at a point	normal(cos x,1)

d. Intégration category

Name	Number of parameters	Description	Examples
Integral	4	Calculates the integral limited by curves of equations $y=f(x)$, $y=g(x)$, $x=a$ and $x=b$ (cf example)	integral(f(x),g(x),a,b)
integralLR	5	Calculates the integral limited by the curves of equation $y=f(x)$, $y=g(x)$, $x=a$ and $x=b$ (cf example). Calculation is done with the left rectangles method with n rectangles.	integralLR(f(x),g(x),a,b,n)
		Calculates the integral limited by	

integralRR	5	<p>the curves of equation $y=f(x)$, $y=g(x)$, $x=a$ and $x=b$ (cf example). Calculation is done with the right rectangles method with n rectangles.</p>	integralRR(f(x),g(x),a,b,n)
integralMP	5	<p>Calculates the integral limited by the curves of equation $y=f(x)$, $y=g(x)$, $x=a$ and $x=b$ (cf example). Calculation is done with the midpoint method with n rectangles.</p>	integralMP(x),g(x),a,b,n)
integralT	5	<p>Calculates the integral limited by the curves of equation $y=f(x)$, $y=g(x)$, $x=a$ and $x=b$ (cf example). Calculation is done with the trapezoid method with n trapezoids.</p>	integralT(f(x),g(x),a,b,n)
integralS	5	<p>Calculates the integral limited by the curves of equation $y=f(x)$, $y=g(x)$, $x=a$ and $x=b$ (cf example). Calculation is done with the Simpson rule with a parameter n between 1 and 10000.</p>	integralS(f(x),g(x),a,b,n)
integralD-	4	<p>Calculates a lower value of the integral limited by the curves of equation $y=0$, $y=f(x)$, $x=a$ and $x=b$ (cf example). Calculation is done with the Darboux's rule with n rectangles.</p>	integralD-(f(x),a,b,n)
integralD+	4	<p>Calculates an upper value of the integral limited by the curves of equation $y=0$, $y=f(x)$, $x=a$ and $x=b$ (cf example). Calculation is done with the Darboux's rule with n</p>	integralD+(f(x),a,b,n)

		rectangles.	
area	4	Calculates the area limited by the curves of equation $y=f(x)$, $y=g(x)$, $x=a$ and $x=b$ (cf example)	area(f(x),g(x),a,b)
areaLR	5	Calculates the area limited by the curves of equation $y=f(x)$, $y=g(x)$, $x=a$ and $x=b$ (cf example). Calculation is done with the left rectangles method with n rectangles.	areaLR(f(x),g(x),a,b,n)
areaRR	5	Calculates the area limited by the curves of equation $y=f(x)$, $y=g(x)$, $x=a$ and $x=b$ (cf example). Calculation is done with the right rectangles method with n rectangles.	areaRR(f(x),g(x),a,b,n)
areaMP	5	Calculates the area limited by the curves of equation $y=f(x)$, $y=g(x)$, $x=a$ and $x=b$ (cf example). Calculation is done with the midpoint method with n rectangles.	areaMP(f(x),g(x),a,b,n)
areaT	5	Calculates the area limited by the curves of equation $y=f(x)$, $y=g(x)$, $x=a$ and $x=b$ (cf example). Calculation is done with the trapezoid method with n trapezoids.	areaT(f(x),g(x),a,b,n)
areaS	5	Calculates the area limited by the curves of equation $y=f(x)$, $y=g(x)$, $x=a$ and $x=b$ (cf example). Calculation is done with the Simpson's rule with a parameter between 1 and 10000.	areaS(f(x),g(x),a,b,n)
areaD-	4	Calculates a lower value of the area limited by the curves of equation $y=0$, $y=f(x)$, $x=a$ and $x=b$ (cf	areaD-(f(x),a,b,n)

		example). Calculation is done with the Darboux's rule with n rectangles.	
areaD+	4	Calculates an upper value of the area limited by the curves of equation $y=0$, $y=f(x)$, $x=a$ and $x=b$ (cf example). Calculation is done with the Darboux's rule with n rectangles.	areaD+(f(x),a,b,n)

e. Search category

Name	Number of parameters	Description	Examples
Infx	3	Returns the list of the abscissa between a and b for which the expression $f(x)$ admits a minimum	Infx(f(x),a,b)
Infx-	3	Returns the smallest abscissa between a and b for which the expression $f(x)$ admits a minimum	Infx-(f(x),a,b)
Infx+	3	Returns the biggest abscissa between a and b for which the expression $f(x)$ admits a minimum	Infx+(f(x),a,b)
Supx	3	Returns the list of the abscissa between a and b for which the expression $f(x)$ admits a maximum	Supx(f(x),a,b)

Supx-	3	Returns the smallest abscissa between a and b for which the expression f(x) admits a maximum	Supx-(f(x),a,b)
Supx+	3	Returns the biggest abscissa between a and b for which the expression f(x) admits a maximum	Supx+(f(x),a,b)
MinF	3	Returns the minimum of the expression f(x) on the interval [a;b]	Minf(f(x),a,b)
MaxF	3	Returns the maximum of the expression f(x) on the interval [a;b]	Maxf(f(x),a,b)
Extrx	3	Returns the list of the abscissa between a and b for which the expression f(x) admits an extremum	Extrx(f(x),a,b)
Extrx-	3	Returns the smallest abscissa between a and b for which the expression f(x) admits an extremum	Extrx-(f(x),a,b)
Extrx+	3	Returns the biggest abscissa between a and b for which the expression f(x) admits	Extrx+(f(x),a,b)

			an extremum	
Pointx	3	Returns the list of the abscissa between a and b for which the expression $f(x)$ gives y.		Pointx(f(x),y,a,b)
Pointx-	3	Returns the smallest abscissa between a and b for which the expression $f(x)$ gives y		Pointx-(f(x),y,a,b)
Pointx+	3	Returns the biggest abscissa between a and b for which the expression $f(x)$ gives y		Pointx+(f(x),y,a,b)
Interx	4	Returns the list of the abscissa between a and b for which $f(x)=g(x)$		Interx(f(x),g(x),a,b)
Interx-	4	Returns the smallest abscissa between a and b for which $f(x)=g(x)$		Interx-(f(x),g(x),a,b)
Interx+	4	Returns the biggest abscissa between a and b for which $f(x)=g(x)$		Interx+(f(x),g(x),a,b)
Intery	4	Returns the list of the ordinate of the intersection points between the curves of the functions f		Intery(f(x),g(x),a,b)

		and g on the interval [a;b]	
Intery-	4	Returns the smallest ordinate of the intersection points between the curves of the functions f and g on the interval [a;b]	Intery-(f(x),g(x),a,b)
Intery+	4	Returns the biggest ordinate of the intersection points between the curves of the functions f and g on the interval [a;b]	Intery+(f(x),g(x),a,b)

f. Statistic category

Name	Number of parameters	Description	Examples
Min	2 and + or a list of numbers	Returns the minimum of a list of numbers	min(2,1,4,3), min(list(2,1,3,4))
Max	2 and + or a list of numbers	Returns the maximum of a list of numbers	max(2,1,4,3), max(list(2,1,3,4))
Mean	2 and + or a list of numbers	Returns the mean of a list of numbers	Mean(2,1,4,3, Mean(liste(2,1,3,4))

g. Trigonometry category

Name	Number of parameters	Description	Examples
Cos	1	cosinus function (parameter in radians)	cos(0) = 1, cos(pi/2) = 0

Sin	1	sinus function (parameter in radians)	$\sin(0) = 0, \sin(\pi/2) = 1$
Tan	1	tangent function (parameter in radians)	$\tan(0) = 0$
CTan	1	cotangente function	$\text{ctan}(2) = -0.457658$
ACos	1	arccosinus function	$\text{acos}(1) = 0$
ASin	1	arcsinus function	$\text{asin}(0) = 0$
ATan	1	arctangent function	$\text{atan}(0) = 0$
Cosh or ch	1	hyperbolic cosinus function	$\text{cosh}(1) = 1.543081$
Sinh or sh	1	hyperbolic sinus function	$\text{sinh}(1) = 1.175201$
Tanh or th	1	hyperbolic tangent function	$\text{tanh}(1) = 0.761594$

h. "Other" category

Name	Number of parameters	Description	Examples
If	3	The first parameter is a condition The second one is the returned value if the condition is verified The third one is the returned value if else	$\text{if}(x \geq 0 \text{ and } x < 1, 1, 0)$
Simplify	1	Simplifies an expression	$\text{Simplify}(x^2x+1-1) = x^2$
Expand	1	Expands an expression	$\text{Expand}((x-1)^2) = x^2-2x+1$
Solve	2	Isolate a variable (x or y) in a relation between x and y	$\text{Solve}(1/(x^2+1)=1-y,x)$ $\text{Solve}(1/(x^2+1)>1-y,x)$
List	1 and +	Creates a list of numbers	$\text{List}(2,1,3,7,4)$
Index	2	Returns the nth element in a list (the first index is 0)	$\text{Index}(\text{List}(4.1, 2.5, 3.2, 1.5), 2) = 3.2$
Points	2 and +	Calculates one or more lists of numbers Version 1 : $\text{points}(\text{list of numbers}, \text{expr1}, \text{expr2}...)$ Version 2 : $\text{points}(bmin, bmax, step, \text{expr1}, \text{expr2}...)$	$\text{points}(\text{supx}(\cos x, 0, 20), \sin x, \cos x)$ $\text{points}(0, 10, 1, \cos x, \exp x, \log x)$

Sort	1	Sorts a list of numbers	Sort(list(2,1,3,7,4))
Paf	2	Calculate a piecewise affine function from points	Paf(list(-2,-1,0,1,2),list(1,-1,0,2,0))
Tdn	1	Converts a number to decimal notation	Tdn(3/2) = 1.5
Tfn	1	Converts a number to fractional notation	Tfn(1.5) = 3/2

Standard constants

By Olivier ANSQUER

List of standard constants

Name	Description	Value
PI	...	3.14159265358979323846
E	...	2.718281828
INF	This constant represents an infinite value. It can be used as a parameter for the Ki function, to indicate an infinite bound.	

Users functions

Par Olivier ANSQUER

1. Presentation

a. Creation/edition

To display the dialog box to create functions, you can :

- click on Document > New function...
- Display the functions list in the Document bar and click on the top left button or double click in a blank part of the list.

To edit a function, you can :

- In the functions list, click on the name of the one you want to edit and press the space key.
- In the functions list, double click on the name of the function you want to edit.

The options are as follows :

- **Name**
The name of a constant has to respect the following rules :
 - its name must begin with a letter or underscore
 - The other characters must be letters, figures or underscores
 - The name can end with one or more 'l'
 - The name must not be used for another object in the calculator (function, constant or parameter)

- **Type**
 - Simple function : it is a function defined on an interval with a single expression with one or more variables.
 - Piecewise function : it is a function defined on several intervals with a single variable.
- **Variables** (in the case of a simple function)
The names of the variables have to be separated by commas.
The name of each variable has to respect the following rules :
 - Its name must begin with a letter or underscore
 - The other characters must be letters, figures or underscores
 - The name can end with one or more '
 - Two variables cannot have the same name
- **Expression** (in the case of a simple function)
You have to use the variables declared in "Variables" when you create the function.
This expression runs every time you use the function and it returns the result.
- **Variable** (in the case of a function defined on more than one intervals)
This is the variable of the function.
The name of the function has to respect the following rules :
 - Begin with a character or with an underscore.
 - The other characters have to be letters, figures or underscores.
 - The name can end with one or more '
- **Number of intervals** (in the case of a function defined on more than one intervals)
The number of intervals of the function.
- **The table** (in the case of a function defined on more than one interval)
This table allows you to enter the expressions and the bounds of the intervals.

If you do not want to define a function on one interval, leave a blank cell.

- **Description**
This is a description associated with the function. It is displayed in a tooltip when you leave the cursor for a few seconds over the name of the function in the list of the functions.

Example 1

A function called Euro which converts Dollars into Euro.

Name : Euro
Type : simple function
Parameters : Dollars
Expression : Dollars/1.005
Description : Conversion function from Dollars to Euros

Example 2

A function called U which returns 0 if the parameter is negative and 1 else.

Name : U
Type : piecewise function
Parameter : x
Number of intervals : 2
Intervalle 1 : condition : $x < 0$, expression : 0
Interval 2 : expression : 1
Description : U function

b. Use

You can use the user's function as the standard functions.

Examples

Euro function : *Euro 50* ou *Euro(100)*

U function : *U -1* ou *U(1)*

c. Delete

To delete a function, select it and click on the delete button (the one with a red cross) in the button bar at the top of the list. If this function is in use, you cannot delete it and a message gives you the list of the objects preventing the deletion.

2. Default functions

Default functions are available in every new document. To access those functions, click on "Tools > Default functions..."

You can create or edit those functions like any other user's function.

User constants

By Olivier ANSQUER

1. Presentation

a. Creation/edition

To open the dialog box to create a constant you can :

- In the document menu, click on "New constant"
- In the document bar, display the constants list (in the data tab by default) and click on the top left button of the list or double click on a blank part of the list.

To edit a constant, you can :

- Select the constant in the list and press the space key.
- In the constant list, double click on the constant you want to edit.

When you are editing a constant, you can modify its description only.

The options of the dialog box for creating or editing constants are :

- **Name**
The name of a constant has to respect the following rules :
 - Its name must begin with a letter or underscore
 - The other characters must be letters, figures or underscores
 - The name can end with one or more '
 - The name must not be used by another object in the calculator (function, constant or parameter)
- **Value**
Value of the constant.
- **Description**

It is a description of the constant. It is displayed in a tooltip when you leave the cursor a few seconds over the name of the constant.

b. Use

When you want to use a constant, just use its name.

c. Delete

You cannot delete a constant. You can only cancel its creation with Cancel in the Edition menu.

2. Default constants

You can use default constants in every new document. You can see the list of the default constants in the menu "Tools > Default constants..".

These constants can be created or edited like any other constant. If you edit a default constant, you can change its name or its value.

User parameters

By Olivier ANSQUER

a. Creation/edition

To display the parameter creation dialog box, you can :

- Click on "Document > New parameter..."
- In the document bar, display the list of parameters and click on the top left button or double click in the blank part of this list.

To edit an existing parameter, you can :

- Select the parameter in the parameters list of the document bar and press the space key.
- Double click on the parameter name in the parameter list in the document bar.

The options of the dialog box for creating or editing parameters are :

- **Name**

The name of a parameter has to respect the following rules :

- Its name must begin with a letter or underscore
- The other characters must be letters, figures or underscores
- The name can end with one or more '
- The name must not be used for another object in the calculator (function, constant or parameter)

If you cannot change the name of a parameter (grey text), it is because the parameter is used by another object.

- **Value**

Parameter value.

- **Minimum Value**

Minimum value of the parameter. Comment : you can give smaller values in the dynamic mode.

- **Maximum Value**

Maximum value of the parameter. Comment : you can give bigger values in the dynamic mode.

- **Description**

It is a description of the parameter. It is displayed in a tooltip when you leave the cursor for a few seconds over the name of the parameter.

b. Using

To use a parameter, just enter its name.

c. Deletion

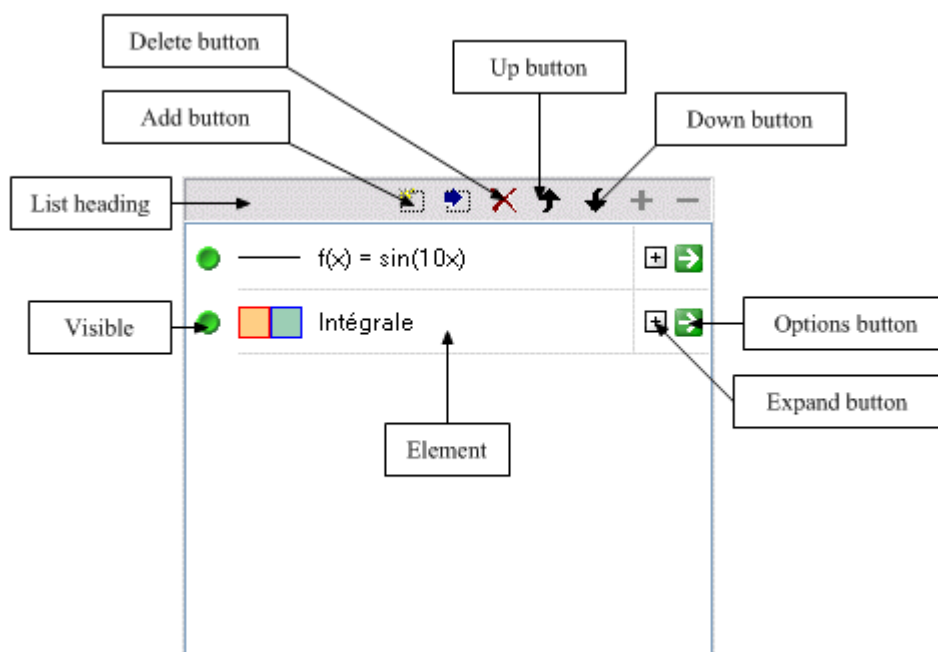
To delete a parameter, select it and click on the red cross button in the button bar at the top of the list. You cannot delete a parameter if it is used.

About the graphic interface

By Olivier ANSQUER

1. Lists

You will often find in Graphe Easy lists like this one :



Every list is made up of a heading with buttons and a list.

When you leave your cursor over a button of the heading, a tooltip gives you a brief description of this button.

These buttons are :

- **The add button**
To create a new element in the list.
- **The delete button**
To delete the selected element.
- **The up button**
To move up the selected element.

- **The down button**

To move down the selected element.

In graphic objects lists, moving up or down an object means modifying the order the objects are displayed. Graphe Easy displays objects from the top to the bottom.

Some elements are only present on graphic objects lists :

- **Visible symbol**

When it is green, it means that the object is displayed and when it is red, it means the object is hidden (but not deleted). If it is a warning, it means the object cannot be displayed (ex : a point whose abscissa is $1/a$ with $a=0$). Click on the symbol to hide or display the object.

- **Expand button**

If you click on this button, you can see more information about the object.

- **Options button**

This button displays the properties of the object.

Double clicking on an element displays its properties
 Double clicking in a blank part of the list creates a new element.
 A right click on a graphic object displays a menu.

2. Lists of properties

The lists of properties are very important in Graphe Easy.

The screenshot shows a 'Scatterplot' list of properties in Graphe Easy. The list is organized into sections, each with a heading and a reduction button (upward arrow). The sections are:

- Scatterplot** (Heading): Contains the name 'Scatterplot'.
- Display options** (Reduction button): Contains several checkboxes: 'Display points' (checked), 'Link points', 'Display labels', 'Link points to x axis', and 'Link points to y axis'.
- Points** (Text zone): Contains the text 'How many lines : 3' and a table with 3 rows and 3 columns: 'Abcissa', 'Ordinate', and 'Label'.
- Appearance** (Table): Contains two dropdown menus: 'Points links' and 'Points'.

Annotations on the right side of the image point to these specific elements: 'Heading', 'Reduction button', 'Check box', 'Text zone', and 'Table'.

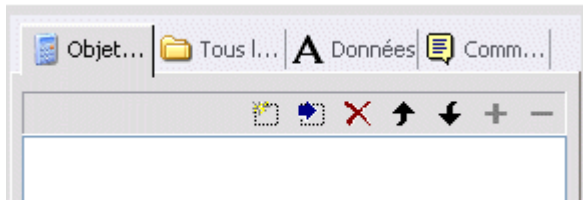
Lists are made up of sections. Every section contains a heading (cf image) and elements. Some sections contain a reduction button. You can click on to hide the section (you can also reduce the section by double clicking in a blank part of its heading).

You can press TAB or Shift+TAB to move in the list.

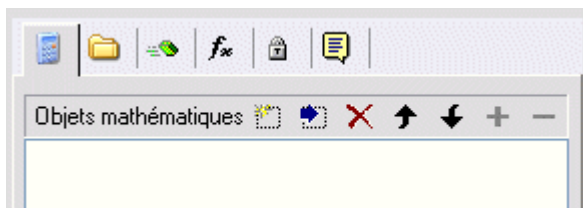
Many elements can be activated with the SPACE key.
 Tooltips are available when leaving the cursor a few seconds over the elements.

3. The document bar

The Document Bar contains all the data of the active document. Its default aspect is the following::



But if you tick Tools > Options > Document Bar > "Condensed Document Bar" and if you restart Graphe Easy, it looks as follows :



This presentation makes the parameters, constants and functions lists more accessible. In Tools > Options > Document Bar, you can also choose the tabs you want to display.

4. Personalisation

You can customize the graphics interface of Graphe Easy. In Display > Customize..., the dialog box displays the following tabs :

- Commands : you can drag and drop the elements to the menus or to the toolbar of Graphe Easy.
- Toolbars : to create and manage the toolbars.
- Tools : to manage the elements of the tools menu.
- Keyboard : to manage hotkeys.
- Menu : to manage the menus of Graphe Easy.
- Options : a few options to manage the graphic interface.

5. Back-up/recovery

In Display > Interfaces, you can save the whole aspect of the graphic interface. To get it back later, just go to Display > Interfaces and click on the name of your saved interface.

Customize the interface

By Laurent HIVON

1. Presentation

Graphe Easy allows you to create and use several interfaces simultaneously.

For example, you can create a simple interface for your pupils with only one toolbar which contains all the tools they have to use.

An interface is made of :

- Customized toolbars and menus.
- The layout of the tool bars on the screen.

- Locked or unlocked access to features.

Every interface is saved as a **its-name.reg** file.

If you want to know where this file is, just do a click on Tools > Options > Folders.

To copy interfaces from a PC to another one

To export interfaces from a PC :

- Click on Display > Interfaces > Options > Export...
- Choose the folder you want to save the interface in.
- Click on "OK".

To import interfaces on a PC :

- Click on Display > Interfaces > Options > Import...
- Choose the folder containing the interfaces you want to import.
- Click on "OK".

2. To create a new interface

a. Toolbar and menus creation/modification

1. Click on Tools > Customize.
2. To modify a Toolbar, display it and follow steps 6 and 7.
3. Click on Toolbar > New.
4. Name the new toolbar then click on "OK". A new empty toolbar is displayed, even if it may be hidden behind the active dialog box.
5. Click on the Commands tab.
6. Select the categories one by one, and for each, drag and drop the icon you want into your new toolbar. You can sort the icons of the toolbar whenever you want.
7. Click on "Close" when it is finished.

b. How to rearrange the toolbars in the window of Graphe Easy

You just have to move the toolbars wherever you want.

c. To choose lock options

- Click on Tools > Lock...
- Select the lock options you want to activate.
- Choose a password (optional) and click on "OK".
- Click on "OK".

d. To save the new interface

- Click on Display > Interfaces > Create/Modify...
- Choose the name of your new/modified interface.
- Click on "OK".

e. To customize the use of this new interface

You can choose an interface at the start up of Graphe Easy :

- Click on Display > Interfaces > Options.



- Tick "Choosing an interface at the start-up".

To choose a default interface :

- Click on Display > Interfaces > Options.
- Select "Default Interface".

3. To add new tools

You can run external applications, directly from Graphe Easy. For example, if you want to run WordPad :

- Click on Tools > Customize.
- Click on the Tools tab and then on .
- Enter "WordPad" in the text zone.
- Click on  and look for the wordpad.exe file.
- Click on "Close".

Mathematical objects

By Olivier ANSQUER

What is called a mathematical object is a curve, integral, inequation, scatter plot, sequence...

1. Creation

There are different ways to create a mathematical object :

- **From the Menu bar :**
 - Click on "Document > New mathematical object" and then :
 - Select "Choice of the type..." to display a dialog box to choose the mathematical object type you want to create.
 - Click on "Ditto" to create an object of the same type as the last created.
 - Select a type in one of the sub-menus.
- **From the Document bar**

Displayed on the left of the screen, it contains all the objects of the document. If it is not displayed, click on "View > Document bar".

In the "mathematical objects" list (first tab on the left), add a new object ([see graphic interface](#) to get more information about creating elements in a list).

If you use one of the ways mentioned above in which the object type is not given, a dialog box is displayed to allow you to choose the type of the mathematical object you want to create. In the left list, click on the category you want, and double-click on the object (or click on the object and click on the next button) on the right side of the dialog box.

A dialog box is displayed to edit the properties of the object ([see the graphic interface page](#)).

Example

Create a curve of the equation $y = \cos x$

1. Click on "Document > New mathematical object > Choice of the type..".
2. Click on "Basic Types" and on "Curves of the equation $y = f(x)$ " to select it and click on the next button.

3. *In the properties screen, the default name "y" is ok. Just enter the expression "cos x".*
4. *Click on end.*

2. Edition

To edit one of the mathematical objects in the "mathematical objects" list from the document bar, you can :

- Double-click on the name of this object.
- Do a right click on the object and select "Properties..." in the contextual menu.

If an object is already used by another one, several properties may be unavailable.
Ex : You create " $y_1(x)=\cos(x)$ " and " $y_2(x)=y_1(x+1)$ ". When you edit " $y_1(x)=\cos(x)$ ", you cannot change its name because it is used by " $y_2(x)=y_1(x+1)$ ".

3. Results

With some objects, you can display results. To do it, do a right click on the object and select "Results..." in the menu.

4. Deletion

To delete a mathematical object, select it in the "mathematical objects" list of the document bar and click on the "Delete" button ([see the graphic interface page](#) for further information).

Of course, you cannot delete an object if it is still used by another one.

5. Definitions

[Statistic definitions.](#)

6. Further information about properties and mathematical objects

a. Implicit curves ($f(x,y)=0$)

When you create an implicit curve, x_{min} , x_{max} , y_{min} and y_{max} are the one of the active view. After the creation of the object, if you want to recalculate the curve with the limits of the actual view, do a right click on the object and select "Recalculate..." in the menu.

b. Discontinuity limit

This property is available for most of all the $y = f(x)$ or $x = f(y)$ curves. The attempted value has to be between 0 and 100.

It represents a limit. Below this limit, Graphe Easy considers there is a discontinuity in the curve.

For a $y=f(x)$ curve

The view height is n pixels and discontinuity limit is l .

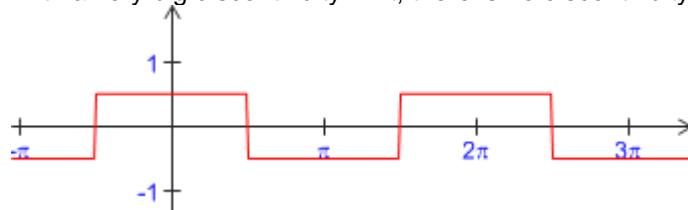
If two points of the curve are far from more than $(l*n)/100$ pixels in ordinate they will not be connected.

When you do not want to connect connected points, choose a bigger discontinuity limit.
When you want to connect disconnected points, choose a smaller discontinuity

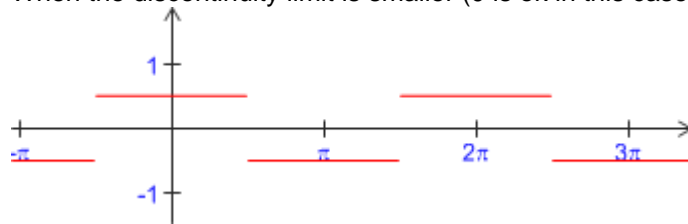
limit.

Example 1 : $f(x) = \text{int}(\cos(x))+0.5$

With a very big discontinuity limit, there is no discontinuity :

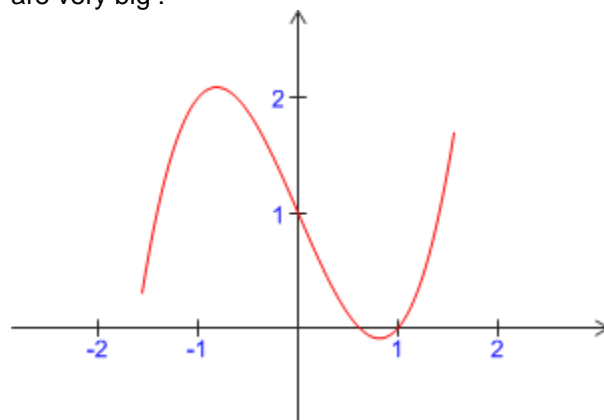


When the discontinuity limit is smaller (0 is ok in this case), we can have this :

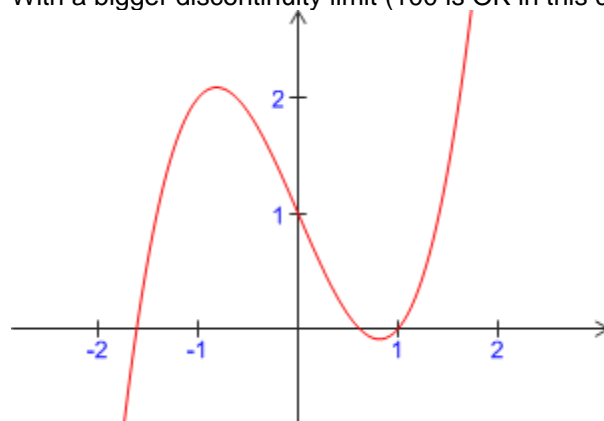


Example 2 : $f(x) = x^3-2x+1$

With a very small discontinuity limit, the curve is not drawn where its slopes are very big :



With a bigger discontinuity limit (100 is OK in this case), we can have this :



c. Affect real coordinates to points

To get a better drawing, you had better tick this box. If the object is made up of horizontal/vertical lines, do not tick this box to avoid a blurred drawing.

Statistic definitions

By Laurent HIVON

1. Discrete data

Here are the definitions used in Graphe Easy for discrete data :

Word	Definition
First centile	The smallest value below which 1% of the population lie.
First decile	The smallest value below which 10% of the population lie.
First quartile	The smallest value below which 25% of the population lie.
Median	The middle term, or, if there is an even number, the average of the two middle terms when the values are written out in ascending order.
Third quartile	The smallest value below which 75% of the population lie.
Ninth decile	The smallest value below which 90% of the population lie.
99° centile	The smallest value below which 99% of the population lie.

2. Continuous data

Here are the definitions used in Graphe Easy for continuous data :

Word	Definition
First centile	The smallest value below which 1% of the population lie.
First decile	The smallest value below which 10% of the population lie.
First quartile	The smallest value below which 25% of the population lie.
Median	The smallest value below which 50% of the population lie.
Third quartile	The smallest value below which 75% of the population lie.
Ninth decile	The smallest value below which 90% of the population lie.
99° centile	The smallest value below which 99% of the population lie.

3. Time series

Graphe Easy uses multiplication to treat time series. Starting with Y data given by the user :

- Graphe Easy smoothes data with the moving average rule. It gives new data Y'.
- Graphe Easy applies the least squares approximation to the Y' data. It gives T data.
- Graphe Easy calculates $S=Y/T$.
- Then, Graphe Easy calculates the base series S_x with the corresponding S values using arithmetic mean.


Graphic objects

By Olivier ANSQUER

Graphic objects allow you to illustrate and comment your curves. There are plenty of them : lines, rectangles, images, labels....

1. Creation

First, you have to choose the type of the object you want to create. So you can :

- Click on " Document", and select an element in one of the submenu 'Lines', 'Basic forms', 'Arrows' or 'Texts and balloons'.
- In the drawing toolbar, click on  and select an element in the menu.

Once you have selected the type of the object, draw a rectangle in the view with the mouse (comment : for the balloons there is one more step but it is very easy to understand how it works). If the rectangle is just a point, no object will be created.

When the object is created, it is in the list of all the objects in the document bar.

2. Edition

To edit a graphic object, be sure no tool is selected (press Escape).

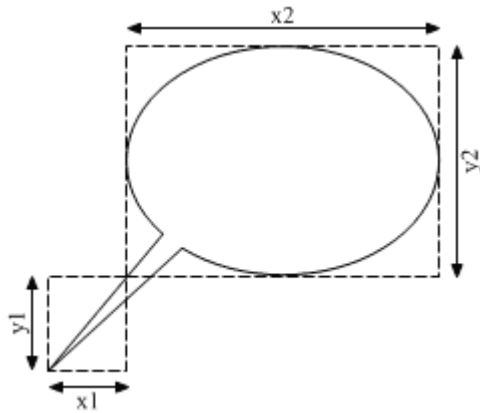
You can move the graphic object with your mouse. To resize it, click on it and move the handles.

To edit the object properties, double click on it or on the name of the object in the list of all the objects in the document bar.

3. Position

You can position a graphic object different ways depending on its type :

- **Standard Position**
Available for all the "rectangular" objects. Enter the abscissa of the right and the left side and enter the ordinate of the upper and the lower side.
- **Position with anchorage**
Available for all the "rectangular objects". Enter the coordinates of the anchorage point and the pixel size of the object. This kind of position is well adapted to the texts because the position does not change even if you are zooming or moving the view.
- **Fixed position in the view**
Available for all the "rectangular" objects. For every side, enter the position depending on the view.
- **Fixed position in the view with anchorage**
Available for all the "rectangular" objects. Enter the position of the anchorage point (depends on the view) and enter the pixel size of the object. This type of position is well adapted to texts because the size does not change even if you are zooming or moving the view.
- **Points 1 et 2 anchored**
Available for all the "lines" objects. Enter the coordinates of the two extremities of the line.
- **Point 1 anchored**
Available for all the "lines" objects. Enter the coordinates of an extremity and enter the distance (in pixels) between the two extremities.
- **Position of balloons and labels**
These objects are designed to point out an object. You can write a text in them. Enter the coordinates of one point and the position of the "rectangular" zone (which can be a text zone).



The distance between these two parts that you have to enter in the object properties is represented in the upper drawing as x_1 and y_1 .

The size of the text zone that you have to enter in the object properties is represented in the upper drawing as x_2 and y_2 .

4. Texts

You can associate a comment to any graphic object. To do it, just tick "Text" in the "Displayed elements" section. Enter the text in the "Text" section.

If the type of a graphic object is always used to display texts :

- Tick "Text" in the "Displayed elements" section of this type of object,
- Do a right click on the object and select " Set up as default properties".

Now, every time you will be creating this type of object a dialog box allows you to enter your text.

Graphe Easy allows you to create dynamic texts. These texts are containing zones between (* and *). The text displayed in these zones contains the result of the calculation made by the Graphe Easy calculator :

Examples

1. Simple calculation :
Entered text : *This is the result : (*1/2+2*)*
Displayed text : This is the result : 5/2
2. Parameter value display :
Entered text : *ParameterName = (*ParameterName*)*
Displayed Text : *ParameterName = 2.3*
3. Integral value display :
Entered text : *I = (*Integral(0,x²,1,5)*)*
Displayed text : *I = 41.33333*

Move in a view

By Olivier ANSQUER

To modify the view, use the tools available in the Zoom menu and in the toolbar "Zoom and Move functions". This page explains how to use the main tools of this category.

1. Window range

This displays a dialog box allowing you to enter the boundaries of the visible zone. To be used when you want to enter very precise limits.

2. Zoom +/-

Select this command and :

- Do a left click if you want to zoom-in x2 and centre the view where you have clicked.
- Do a right click if you want to zoom-out x2 and centre the view where you have clicked.

3. Dynamic Zoom

Select the command, press the left button of the mouse and :

- Move to the top to zoom in.
- Move to the bottom to zoom out.

While "Dynamic zoom" is selected, pressing the "Ctrl" key gets you to "Dynamic move".

4. Zoom box

Select the command, draw a rectangle on the view to zoom on this selected area.

5. Centre the view

Select the command and click in the view to centre where you have clicked.

6. Dynamic move

Select the command, press the left button and move your mouse.

While "Dynamic move" is selected, pressing the "Ctrl" key gets you to "Dynamic zoom".

7. Adjust horizontally/vertically

Adjust the selected axis to get an orthonormal basis.

8. Stretch/shrink horizontally

Double or reduce by half the view of the units on the x-axis.

9. Stretch/shrink vertically

Double or reduce by half the view of the units on the y-axis.

The wheel of the mouse allows you to zoom on the view.
Leave the middle button of the mouse pressed allows you to move the view.

Dynamic mode

By Olivier ANSQUER

1. What is it ?

The dynamic mode makes you see the influence of a parameter variation on your graphs. You

make your parameter change step by step. You can create animations too.

2. Using

a. Prepare the document

In all cases, your document must contain a parameter if you want to use the Dynamic mode ([about parameters](#)).

b. Run the dynamic mode

First, display the dialog box to manage the dynamic mode : click on "Display > Dynamic mode dialog box".

Then click on the down left button (dynamic mode range). you can choose the dynamic parameter, its bounds and its step.

If you enter minimum and maximum values in the parameter properties, these values will be applied as default values in the dynamic mode.

In the options section, you can set the speed of the parameter variations and the value of the parameter when you stop the dynamic mode.

To activate the dynamic mode, click on the red exclamation mark.

c. Using the dynamic mode

You can use it from the dynamic mode dialog box. The nine central buttons are associated to a hot key (see the pop-up menu on each button).

To leave the dynamic mode, click on the "Square" button.

The "Floppy disk" button allows you to save the images sequence as a file sequence or as an animated gif.

The calculator

By Olivier ANSQUER

1. Introduction

The calculator is displayed in the bottom left part of the screen.
If it is not, just click on "Display > Calculator".

The results of the calculations are displayed when you press the Enter key. That's all ! To go further :

- A right click displays a contextual menu which allows you, among other things, to insert functions.
- The Up and Down keys allow you to edit the previous calculation.
- The F2 key clears the screen of the calculator.
- If you select a function or a constant and if you press the F1 key, a help window appears in a pop-up menu.

2. Examples

a. Calculates a derivative

Use the Derive function.

Ex : Derivative of x^2+3x-1 .

> Derive(x^2+3x-1)

$2x+3$

b. Find the equation of a tangent

Use the Tangent function.

Ex : Find the equation of the tangent of $y = \cos x$ at $x=2$.

> Tangent($\cos x,2$)

$-0.9092974*x+1.402448$

c. Find the extremums of a function

Use the extrx, extrx- or extrx+ functions.
if you only want the maximums, use the supx, supx- or supx+ functions.
That is the same for the minimums with the infx, infx- or infx+ functions.

Ex : Find the extremums of $y = \cos x$ on $[0,10]$.

> Extrx($\cos x,0,10$)

{ 0 ; 3.141593 ; 6.283185 ; 9.424778 }

Ex : Find the first minimum of $y = \cos x$ on $[0,10]$.

> Infx-($\cos x,0,10$)

3.141593

Ex : Find the last maximum of $y = \cos x$ on $[0,10]$.

> Supx+($\cos x,0,10$)

6.283185

d. Find a point of a curve

Use the Pointx, Pointx- or Pointx+ functions.

Ex : Find the points of the curve of equation $y = \cos x$ on $[0,10]$ with an ordinate 0.5.

> Pointx($\cos x,0.5,0,10$)

{ 1.047198 ; 5.235988 ; 7.330383 }

Ex : Find the first point of the curve of equation $y = \cos x$ on the interval $[0,10]$ with an ordinate 0.5.

> Pointx-($\cos x,0.5,0,10$)

1.047198

e. Find the intersections of two curves

use the Interx, Interx- or Interx+ functions.

Ex : Find the intersections of $y = \cos x$ and $y = \sin x$ on $[0,10]$.

> Interx(cos x,sin x,0,10)
 { 0.7853982 ; 3.926991 ; 7.068583 }

Ex : Find the first intersection of $y = \cos x$ and $y = \sin x$ on $[0,10]$.

> Interx-(cos x,sin x,0,10)
 0.7853982

f. Calculates point series

Use the Points function.

Ex : Calculates the values of $\exp x$ and $\ln x$ when varying x from 0 to 5 with a step of 1.

> Points(0,5,1,exp x,ln x)

x	exp(x)	ln(x)
0	1	ndef
1	2.718282	0
2	7.389056	0.6931472
3	20.08554	1.098612
4	54.59815	1.386294
5	148.4132	1.609438

Ex : Calculates the values of $y = \cos x$ for its extremums on $[0,10]$.

> Points(extrx(cos x,0,10),cos x)

x	cos(x)
0	1
3.141593	-1
6.283185	1
9.424778	-1

Examples

By Olivier ANSQUER

Some examples are delivered with Graphe Easy to illustrate its possibilities. To see them, you just have to click on "File > Samples".

In the opening dialog box, samples are in the selected default directory. You can choose the one you want by browsing in the sub-directories.

View properties

By Olivier ANSQUER

1. How to display it

A few methods are available :

- click right on the view and select "View properties...".
- Select "View > Properties".
- In the list of all the objects in the document bar, edit "Axis and grids".

2. Presentation

The view properties allow you to set very precisely the aspect of your graph and its printing. The tabs are :

a. "General" tab

This allows you to set the window, the background and the type of graph. You can also choose a fixed ratio between the x-axis and the y-axis when they are linear ones.

Do not set a transparent background ! The results would be strange ;=) As there is nothing behind the background there is no need to set the background transparent.

b. "x-axis" tab

This tab allows you to set the aspect of the x-axis and its scale. The "Properties" section allows you to set the displayed elements (scales, labels...) and to set how the elements are displayed.

The "Main graduation size" means the length of the segments on each graduation. The unit is the pixel.

The "Scale" section allows you to choose between a linear and a logarithmic scale.

In the case of a linear scale, you can choose the origin of the axis and a way of graduation.

In the case of a logarithmic scale, you can choose a way of graduation and a format for the numbers.

c. "y-axis" tab

This tab allows you to set the aspect of the y-axis and its scale. The options are the same as the "x-axis" tab.

d. "Font" tab

This tab allows you to choose the fonts used for graduations and axis labels.

e. "Grids" tab

This tab allows you to set different grids : vertical, horizontal, radial and polar grids.

f. "Print" tab

In this tab you will find all the settings about printing the graphs. The first section is about the "Image position". You can set the position of the image on the page. Sometimes you have to give an anchor point which is used when the image is too large for the page.

Example about the use of an anchor point.

You chose to print at a fixed scale (1 cm for 1 unit). Imagine your x-axis is from -10 to 10. So you need a 20 cm width page. If your page is only a 15 cm width one, you have to reduce your x-axis from 20 units to 15 units. If the anchor point is on the left, you will print from -10 to 5 only. If it is centered you will print from -7.5 to 7.5 and if it is on the right, you will print from -5 to 10.

In the "other elements" section, you can choose a title and a border. In the "Options" section, the "print object sizes" element allows you to set the size of objects whose size is in pixels.

Animations

By Olivier ANSQUER

1. Presentation

Graphe Easy allows you to save sequences of actions you can execute later. These sequences are called "Animations". They can help you to illustrate the construction of a graph.

In the document bar, the last tab contains the list of the existing animations. In this tab, you can see different buttons.

Four on the left :

- The first one allows you to create a new animation.
- The second one allows you to modify the current animation (the one selected in the list under the buttons).
- The third one allows you to save the current animation in different files formats (bitmap, metafile or animated gif).
- The fourth one allows you to delete the current animation.

Four buttons on the right allow you to play the current animation :

- The first one allows you to stop the current animation.
- The second one allows you to play one stage of the current animation only.
- The third one allows you to play or to pause the current animation.
- The fourth one allows you to play the animation faster..

These four actions can be executed from the View > Current Animation menu where you can use hotkeys (F9 to F12 by default) also.

2. Creation/edition

When you create or modify an animation, the dialog box contains a zone to enter the name of the animation and another one to display the list of the stages of this animation.

All the stages are played in the order in which they are numbered. You can add, delete or modify stages.

3. What kind of stages are available ?

Most do not need any explanation because they just play automatically basic actions. Here is some informations about some of them :

a. Load object state

If you do a right click on an object name (in the picture, in the "mathematical objects" list or in the "All objects" list) you can click on "Save state..." in the menu and save its current properties under a new name. These states can be

reloaded in this menu by "List of the object states".

This kind of Stage allows you to do exactly the same. You just have to choose the object and load its state.

What is the use of it ? To change the color of a curve, to change the position of a text...

b. Display animation comment

The "Animation" tab contains a comment zone. This kind of state allows you to update the displayed text.

c. Modify displayed area

This action allows you to zoom on a zone of the picture. If you want the zoom to be instantaneous (without any transition), just set up time duration on 0 ms.

d. Go to stage n

Stages are executed in the order in which they are numbered and the animation is finished when the last stage has been played. This kind of stage allows you to go to a precise stage. You just have to indicate its number. The condition is an expression which is calculated when the stage is executed. If the value is not 0, you jump to the designed stages else the animation plays the next stage.

e. Pause

The animation is paused. The user must click again to go on.

f. Play animation

An animation can contain another one.

If you want to play an animation inside another one you just have to put a _ before its name. This one will be displayed apart in the list of animations. It is only to make the difference between the animations and the "sub-animations" which are only animations called by others.

It can be useful when, in an animation, you play the same action several times. In this case, you create an animation containing these actions and you call this animation every time you need it.

Do not hesitate to use this possibility ! If you name your "sub-animation" with an explicit word, your animation will be easier to understand than without it.

Formula editor

By Olivier ANSQUER

1. What is it ?

It is an editor which allows you to create and modify mathematical formulas. These formulas can be inserted in the picture.

2. How to run it ?

a. To illustrate your picture

Mathematical formulas are quite the same as the other graphic objects ([see the graphic objects page](#)). Just do a double-click on the object or make a right-click on it and select "Formula editor..." in the contextual menu.

b. Wysiwyg interface

If you prefer to enter your mathematical expressions with the "wysiwyg" editor instead of doing it as plain text, you can make a right-click in the text zone and select "Formula editor..." in the contextual menu.

3. Using

The editor is made up of with the following elements :

a. A menu

It is at the top of the screen and it allows you to save or open "formulas" files and to export them to a file or to the clipboard. You can access the Windows character map.

If square roots don't print correctly on your computer, in Options, check the available option.

b. A vertical toolbar

These buttons allow you to do the basic actions on formulas (copy and paste, cancel actions...). The second button (the pen) allows you to import a valid Graphe Easy expression into the formula.

Example

Enter the variable "x" and the expression " $\sqrt{(x+2)/3}$ ". Notice that if the editor is displayed as Wysiwyg, you cannot choose the variables.

c. A horizontal toolbar

These buttons allow you to enter the elements of your mathematical formula. To place an element in the formula, just select it. It is applied to the current element.

Examples

If you insert the "square root" element while "x+2" is selected you will obtain the square root of "x+2".
If you insert pi while "x+2" is selected, "x+2" is replaced by "pi".

d. A rectangular zone in which the formula is displayed

This zone contains the formula and allows you to select its different elements. You can drag and drop elements. The arrows of the keyboard

allow you to browse in the formula :

- Left and right keys allow you to move in the same level of the formula.
- Up and Down keys allow you to access to an upper or lower level of the formula.

Example

The formula is "x+2" and "x" is selected.

The left and right keys allow you to move from "x" to "2" and return ("x" and "2" have the same parent : their sum).

The up arrow key allows you to move up and select the "parent" of "x" which is the sum "x+2".

The down arrow key allows you to move down and select the first "son" of the sum : "x".

The contextual menu of this zone allows you to :

- Modify colors, styles and fonts.
- Modify the size of the current element.
- Expand or simplify the current element if it corresponds to a valid Graphe Easy expression.

View styles

By Olivier ANSQUER

1. Presentation

A view style contains all the [view properties](#). These styles allow users to save and easily get view properties often used.

2. Creation

It is very simple. Set the view properties, do a right click on the view and click on "Create a style out of the view...". The style editor opens and you just have to choose a name for this new style.

3. The style editor

The style editor is a dialog box which allows you to create styles. You can display it :

- By a right click in the view and a click on "Style editor...".
- By clicking on View > Style Editor.

The style editor displays all the available styles. You can modify them by clicking on "Properties" or you can apply one of them to the current view by clicking on "Apply to the current view". In the "Default" list you can choose a style which will be applied to any new view.

4. Copy a style to another computer

To copy a style to another computer, you just have to :

1. Click on "Tools > Options".
2. Click on the "Directories" tab and remember the name of the Interface style directory.
3. Go to this directory and copy the file corresponding to the style you want.
4. Paste this file in the equivalent directory of the other computer.

Comments

By Olivier ANSQUER

1. Presentation

You can associate a comment to any document in Graphe Easy. This comment is in the comment tab of the Document bar.

When there is no comment, a help text is displayed.

This comment can be used to describe the graph or to explain how to work with the graph (for example how to use the dynamic mode).

2. Edition

You can create or modify a comment by clicking on "Document > Comment...". If you want to change the font, you can create your comment in WordPad and paste it in Graphe Easy.

You can change the default background colour by clicking on "Tools > Options...".

Drawing images

By Olivier ANSQUER

1. Principle

Here is some information to understand how Graphe Easy manages images and to know how to use it :

a. Available libraries

Graphe Easy can draw images with two different "libraries". A library is a set of computing functions which allow you to draw images. Choosing a library influences the speed of drawing, its quality and the possibilities. The two libraries are :

- **GDI**

Rather quick but :

- You cannot insert images (replaced by a crossed out rectangle)
- You cannot display gradients (replaced by a plain colour)
- You cannot display texts on line objects
- You cannot display some transparency effects
- A few patterns cannot be displayed (replaced by a plain colour)

Using GDI library allows you to see your images quickly.

- **GDI+**

It's slower than GDI. It allows you to draw all the elements of your image and manages transparency. It can also smooth the objects and is more precise than GDI.

b. Rendering quality

Rendering quality influences drawing quality (shades, texts and smoothing for examples), number of points calculated to draw curves and the way grids are displayed.

Available values to manage the rendering quality are from "very low" to "the best". Your choice depends on the relationship between the speed and the quality you want.

c. Different cases

Graphe Easy is parametrized to draw in different situations. These situations are called cases. For example : print, print preview, object edition , view edition ...

d. Final rendering

The final rendering is a drawing operation which is done at the end of an action (zooming, moving an object...).

For example, during the moving of an object we want to have an instant reaction. So, for the " Object edition" case we must parametrize the current library and rendering quality to get a fast drawing.

What happens when the drawing is finished ?

By this time, the "Final pre-rendering" is used to draw the view again. Next if the "Automatic rendering" is activated, the view is drawn using the "Automatic final rendering" case.

The Automatic final rendering runs as a background job so you still can move the object again. You can see the progress of the final rendering in the state bar.

Another final rendering case exists : the "Manual final rendering" that you can run by yourself.

The cases associated to the final rendering are different for the normal mode and for the dynamic mode.

2. Parametrization

a. Where can I parametrize ?

Click on "Tools > Rendering Options...". The displayed dialog box allows you to set :

- Automatic rendering activation.
- The library and the rendering quality associated to every case.

The default settings allow you to obtain top quality prints and exports, fast editions with GDI and a high quality final rendering with GDI+. Note that the manual final rendering is better than the automatic one.

b. Advices

- To get the best results, use the same quality for "Final pre-rendering" and for "Automatic final rendering".
- If "Automatic rendering" is set as "Final pre-rendering", the "Automatic rendering" will never run.
- The Standard toolbar contains a button to activate or deactivate the automatic rendering (default hot-key : press the A key) and a button to run the manual final rendering (default hot key : press the R key). Remember to use them.
- If your graphs contain images that you want to be displayed all the time, use GDI+ for all the available cases.

Lock objects

By Olivier ANSQUER

1. Presentation

You can lock :

- the objects of the "mathematical objects" list in the document bar.
- the objects of the "all objects" list in the document bar (except "Axis and Grids" and "Mathematical objects" List).

Locking an object protect its edition and hides its name and definition. It can be interesting to hide the equation of a curve.

2. Add/delete

To lock an element, just do a right click on its name and click on "Add protection" in the contextual menu. Choose the new displayed label and a password. When an object is protected, you have to enter the password if you want to edit it.

To delete the protection, do a right click on its name, click on "Delete protection" in the contextual menu and enter the password.

Protect Graphe Easy

By Olivier ANSQUER

1. Why ?

When many people can use Graphe Easy on the same computer (for example pupils in a school), it may be interesting to protect or to forbid functions or possibilities (especially the graphic interface ones) if you want to keep a certain configuration.

Example

You have created default constants and functions and you often use them.

You want to use them a few days later but someone has :

- Deleted your constants and functions.
- Moved the toolbars.

It could be annoying...

Protect Graphe Easy can be useful when you want all the computers in a room to be configured in the same way.

2. How ?

Click on Tools > Lock...". If you are asked for a password, it is the one you entered when installing Graphe Easy (except if you entered another one in this dialog box).

You can protect a few actions with a password :

- **Access to ...**
You can protect most parameters of the Graphe Easy interface.
- **Loading an interface (Display menu)**
It will no longer be possible to load another interface by clicking on Display > Interfaces .
- **Creation/modification of an interface (Display menu)**
It will no longer be possible to create/modify/delete interfaces styles by clicking on Display > Interfaces.
- **Choose a default interface (Display menu)**
It will no longer be possible to choose an interface style by clicking on Display > Interfaces.
- **Modify view styles**
The view styles will no longer be available in Tools > Styles editor.
- **Modify objects' default attributes**
Modifying objects' default attributes affects the new objects of this type.

The "Password..." button which is down the page allows you to enter the password required when you want to access all the protected actions.

If the computer is used by many people **you had better enter a password.**
If someone else does it before, you cannot access all the functions of Graphe Easy !

Import and export files

By Laurent HIVON

1. Export graphic files

Graphe Easy saves all files with the extension gef. But you can save them as a bitmap or as a metafile. To do it :

- Do a right click on the view
- Select "Export...".
- Choose the folder, the name of the file, its format and click on OK.

2. Import images

You can insert images in a picture. To do it :

- Click on Document > Basic Forms > Image.
- With the mouse, draw a rectangle on the picture.
- Do a double-click on the displayed image.
- Do a double-click on the displayed image once again.
- Select the image file you want to insert.
- Click on OK.
- Click on OK again.

If you want to put an image as a background of your picture :

- Do a right click in your picture.

- Click on View properties > General > Background > Type > Image.
- Click on Background > Properties > Select image.
- Select your image and click on OK.

3. Export a Mathematical Formula

Graphe Easy allows you to export a mathematical formula written with the editor to paste it in another document :

- Click on Document > Texts and balloons > Mathematical formula.
- Create your formula.
- To copy it to the clipboard :
 - Click on Copy.
 - Select the format you want.
- To save it in a file :
 - Click on Export.
 - Choose the folder.
 - Choose the name of the file.
 - Click on Save.

4. Export and import an interface

Graphe Easy allows you to export interfaces from a PC :

- Click on Display > Interfaces > Options > Export...
- Choose the folder where you want to save your interfaces.
- Click on OK.

Graphe Easy allows you to import saved interfaces :

- Click on Display > Interfaces > Options > Import...
- Choose the folder containig the interfaces.
- Click on OK.

5. Import and export data

a. Import data

Some mathematical objects need to enter many data (Lagrange's polynom, Hermite's polynom, statistics...). If this data is in another document - in a spreadsheet for example-, you can import it. There are two ways to do it :

Import data from a text file

Many applications allow you to export data as a .txt file.

- In your application, save your data as a .txt file.
- In Graphe Easy, do a right click in a cell of the list of points.
- Click on Import.
- Select the .txt file and click on OK.

Import data with a "Copy and Paste"

- In the document containing your data, select it and copy it to the clipboard.

- In Graphe Easy, do a right click in one of the cells of the list of points.
- Click on "Paste list". The size of the list changes automatically and the content is pasted.

By default, when you are importing data, commas are replaced by dots. If you want to de-activate this procedure, just do it in Tools > Options.


b. Export data

Graphe Easy allows you to export data charts as a .txt file :

- In Graphe Easy, do a right click in a cell on a list of points.
- Click on Export.
- Select the folder you want to save your file in.
- Enter the name of your file, click on Save.


6. Export an animation

Graphe Easy allows you to save an animation in different graphic file formats :

- Load the animation.
- In the Document bar, click on the Animations tab
- Click on .
- Select the file format you want to export your animation in (sequence of bitmap files, sequence of metafile files or an animated gif file).
- Click on Save.

7. Export a dynamic graph

Graphe Easy allows you to save a dynamic graph in different graphic file formats :

- Load the animated graph.
- Set it.
- Record the settings.
- Click on .
- Select the file format you want to export your animation in (sequence of bitmap files, sequence of metafile files or an animated gif file).
- Click on Save.