

Wolfram Alpha

Un moteur de recherche de données scientifiques révolutionnaire...

Atelier n°5 - 23 octobre 2012



Enter what you want to calculate or know about:



[Examples](#) [Random](#)

↖ go beyond text input



Enter what you want to calculate or know about:



 **Examples**

 **Random**

 *go beyond text input*



Enter what you want to **calculate** or **know about**



 **Examples**

 **Random**

↖ go beyond text input



calcul formel

visualisation de fonctions

résolveur d'équations

...



basé sur Mathematica

résolveur d'équations

...



langage naturel



mais pas une conversation



+10 000 milliards d'informations

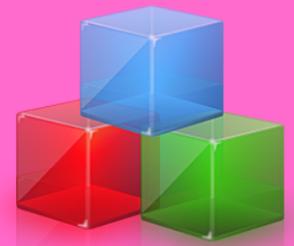
+ 50 000 types d'algorithmes

+ 5000 types de visuels / représentations de données

des capacités linguistiques pour plus de 1 000 domaines

mathématiques, statistiques, analyse de données, physique, chimie, science des matériaux, ingénierie, astronomie, géologie, nouvelles technologies, dates et heures, lieux et géographie, données socioéconomique, météorologie, santé et médecine, alimentation et nutrition, linguistique, culture, médias, personnalités, histoire, éducation, organisations diverses, jeux et sports, musique, couleurs, etc.

disciplines



l'information traitable par calculs

mettre à disposition

collecter les données

organiser les données

implémenter les algorithmes

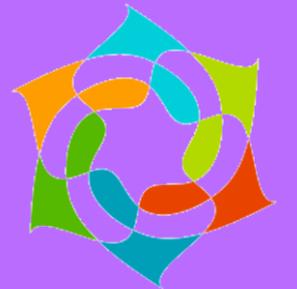
calculer tout ce qui est calculable

pour obtenir des réponses validées

pour la recherche de connaissances

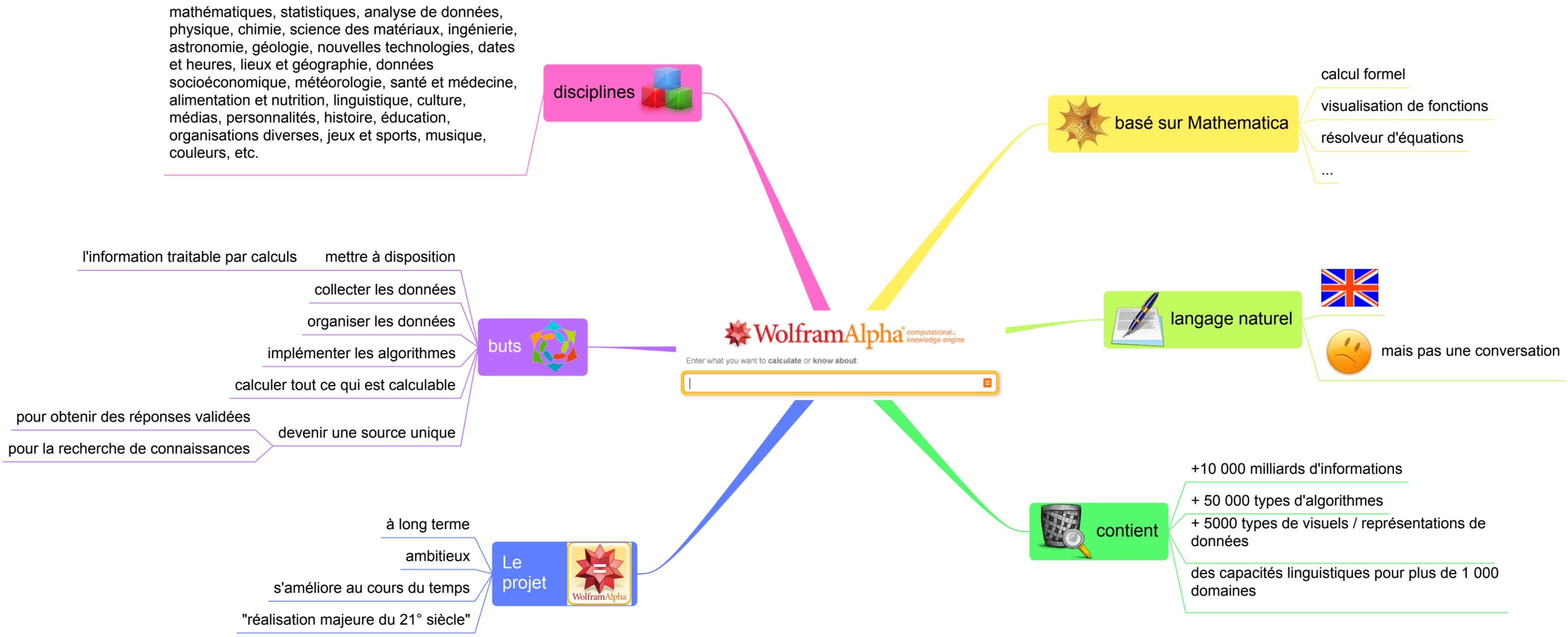
devenir une source unique

but



à long terme
ambitieux
s'améliore au cours du temps
"réalisation majeure du 21^e siècle"





Wolfram|Alpha: Computational Knowledge Engine

www.wolframalpha.com

jeanmichel.mermet@gmail.com | Settings >

 **WolframAlpha** computational knowledge engine

Enter what you want to calculate or know about:

Who was the president of italy in 1968? |

    [Examples](#) [Random](#)

go beyond text input

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démo...

Dans bien des cas, on peut utiliser la documentation de Mathematica pour découvrir la syntaxe de WolframAlpha.

The Wolfram Functions Site

functions.wolfram.com

WOLFRAM RESEARCH

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FUNCTION CATEGORIES

- Elementary Functions
- Constants
- Bessel-Type Functions
- Integer Functions
- Polynomials
- Gamma, Beta, Erf
- Hypergeometric Functions
- Elliptic Integrals
- Elliptic Functions
- Zeta Functions & Polylogarithms
- Mathieu & Spheroidal Functions
- Complex Components
- Number Theory Functions
- Generalized Functions

ALPHABETICAL INDEX

THE WOLFRAM FUNCTIONS SITE

Function of the day ▶ Function Plotting ▶ References wanted ▶

As of October 17, 2012
Current # of formulas: 307,409
Current # of visualizations: 10,828

Providing the mathematical and scientific community with the world's largest collection of formulas and graphics about mathematical functions.

WISH LIST

Report a new formula to:
news@functions.wolfram.com

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Aller à "http://functions.wolfram.com/webMathematica/FunctionPlotting.jsp?name=Cos"

Dans bien des cas, on peut utiliser la documentation de Mathematica pour découvrir la syntaxe de WolframAlpha.

The screenshot shows a web browser window with the address bar displaying "Inverse hyperbolic tangent" and the URL "functions.wolfram.com/ElementaryFunctions/ArcTanh/". The page header includes "WOLFRAM RESEARCH" and "functions.wolfram.com". A search bar is present with the text "Search Site" and a "Go" button. Navigation links include "FUNCTION CATEGORIES", "VISUALIZATIONS", "NOTATIONS", "GENERAL IDENTITIES", and "ABOUT THIS SITE". On the right side of the header, there are links for "Contribute", "Email Comments", and "Sign the Guestbook".

The main content area features a 3D visualization of the inverse hyperbolic tangent function, which is a saddle-shaped surface. Below this visualization, there are links to "VIEW RELATED INFORMATION IN" (The Documentation Center, MathWorld) and "DOWNLOAD FORMULAS FOR THIS FUNCTION" (Mathematica Notebook, PDF File).

The title of the page is "ArcTanh", with the subtitle "Inverse hyperbolic tangent". The page lists the "Mathematica Notation" as $\text{ArcTanh}[z]$ and the "Traditional Notation" as $\tanh^{-1}(z)$.

There are two main sections of content below the title:

- A section titled "Visualizations (225 graphics, 1 animation)" with a right-pointing arrow.
- A section titled "Plotting" and "Evaluation" with right-pointing arrows.

At the bottom, there is a section titled "Elementary Functions" with a dropdown arrow. Underneath, it lists "ArcTanh[z] (3911 formulas)" with a list of sub-sections:

- Primary definition (1 formula)
- Specific values (30 formulas)
- General characteristics (12 formulas)
- Analytic continuations (0 formulas)
- Series representations (68 formulas)

The footer of the page features the "WolframAlpha" logo.

Dans bien des cas, on peut utiliser la documentation de Mathematica pour découvrir la syntaxe de WolframAlpha.

The screenshot shows a web browser window with the title "ArcTanh - Wolfram Mathematica 8 Documentation". The address bar shows the URL "reference.wolfram.com/mathematica/ref/ArcTanh.html". The page features the Wolfram logo and navigation links: PRODUCTS, SOLUTIONS, PURCHASE, SUPPORT, COMPANY, OUR SITES, and a SEARCH button. Below the navigation is a search bar labeled "DOCUMENTATION CENTER SEARCH" and a link "New to Mathematica? Find your learning path >". The breadcrumb trail reads: "Mathematica > Mathematics and Algorithms > Mathematical Functions > Elementary Functions > Hyperbolic Functions > ArcTanh >". The main content area is titled "BUILT-IN MATHEMATICA SYMBOL" and includes links for "Tutorials >", "See Also >", and "More About >". The function name "ArcTanh" is displayed in large bold text. Below it, a yellow box contains the definition: "ArcTanh[z] gives the inverse hyperbolic tangent $\tanh^{-1}(z)$ of the complex number z ." A "MORE INFORMATION" link is visible. At the bottom, there is an "EXAMPLES" section with a "CLOSE ALL" button. Under "Basic Examples (3)", the text "Evaluate numerically:" is followed by the code "In[1]:= ArcTanh[0.5]".

Dans bien des cas, on peut utiliser la documentation de Mathematica pour découvrir la syntaxe de WolframAlpha.

ArcTanh - Wolfram Mathematica 8 Documentation
reference.wolfram.com/mathematica/ref/ArcTanh.html

EXAMPLES

▼ **Basic Examples** (3)

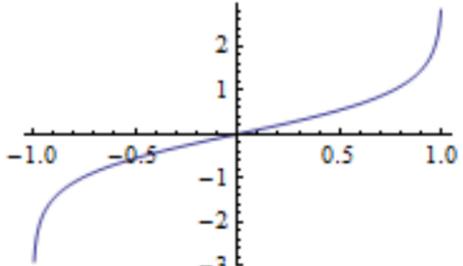
Evaluate numerically:

```
In[1]:= ArcTanh[0.5]
```

```
Out[1]= 0.549306
```

```
In[1]:= Plot[ArcTanh[x], {x, -1, 1}]
```

```
Out[1]=
```



Series expansion about the origin:

```
In[1]:= Series[ArcTanh[x], {x, 0, 20}]
```

```
Out[1]= x +  $\frac{x^3}{3}$  +  $\frac{x^5}{5}$  +  $\frac{x^7}{7}$  +  $\frac{x^9}{9}$  +  $\frac{x^{11}}{11}$  +  $\frac{x^{13}}{13}$  +  $\frac{x^{15}}{15}$  +  $\frac{x^{17}}{17}$  +  $\frac{x^{19}}{19}$  + O[x]21
```

Sum the series:

```
In[2]:= Sum[ $\frac{x^{2n-1}}{2n-1}$ , {n, Infinity}]
```

```
Out[2]= ArcTanh[x]
```

► **Scope** (7)

► **Generalizations & Extensions** (3)

Dans bien des cas, on peut utiliser la documentation de Mathematica pour découvrir la syntaxe de WolframAlpha.

Series expansion about the origin:

```
In[1]:= Series[ArcTanh[x], {x, 0, 20}]
```

```
Out[1]= Series[ArcTanh[x], {x, 0, 20}]
```

Sum the s

 email

<http://wolfram.com/xid/0enztdtth-pcw3>

Dans bien des cas, on peut utiliser la documentation de Mathematica pour découvrir la syntaxe de WolframAlpha.

Series[ArcTanh[x], {x, 0, 20}] - Wolfram|Alpha

www.wolframalpha.com/input/?i=Series%5BArcTanh%5Bx%5D,%20%7Bx,%200,%2020%7D%5D

ArcTanh - Wolfram Mathematica 8 Documentation

Series[ArcTanh[x], {x, 0, 20}] - Wolfram|Alpha

WolframAlpha computational knowledge engine

Series[ArcTanh[x], {x, 0, 20}]

Examples Random

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Input interpretation:

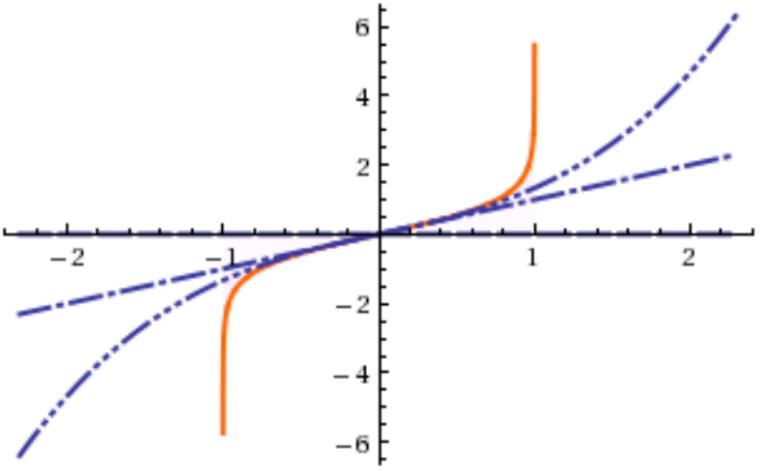
series	$\tanh^{-1}(x)$	point	$x = 0$
		order	x^{20}

$\tanh^{-1}(x)$ is the inverse hyperbolic tangent function »

Series expansion at $x=0$: [More terms](#)

$$x + \frac{x^3}{3} + \frac{x^5}{5} + \frac{x^7}{7} + \frac{x^9}{9} + \frac{x^{11}}{11} + \frac{x^{13}}{13} + \frac{x^{15}}{15} + \frac{x^{17}}{17} + \frac{x^{19}}{19} + \frac{x^{21}}{21} + O(x^{22})$$

Approximations about $x=0$ up to order 3: [More terms](#)



Exécuter le script "#"

Le site de
WolframAlpha
fourmille
d'exemples
prédéfinis...

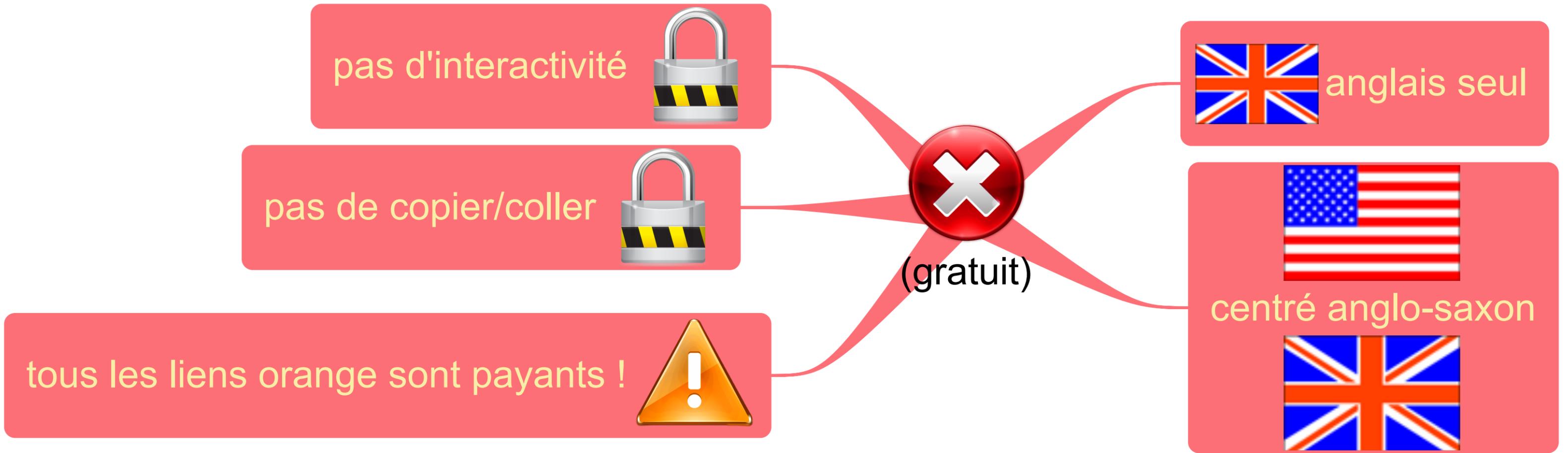
The screenshot shows a web browser window with the title "Wolfram|Alpha Examples - Applied Mathematics". The address bar contains "www.wolframalpha.com/examples/AppliedMath.html". The page features the WolframAlpha logo and a search bar with the placeholder text "What would you like to know about?". Below the navigation menu, the heading "Examples by Topic" is displayed. The main content area is titled "Applied Mathematics" and lists various categories with corresponding example queries:

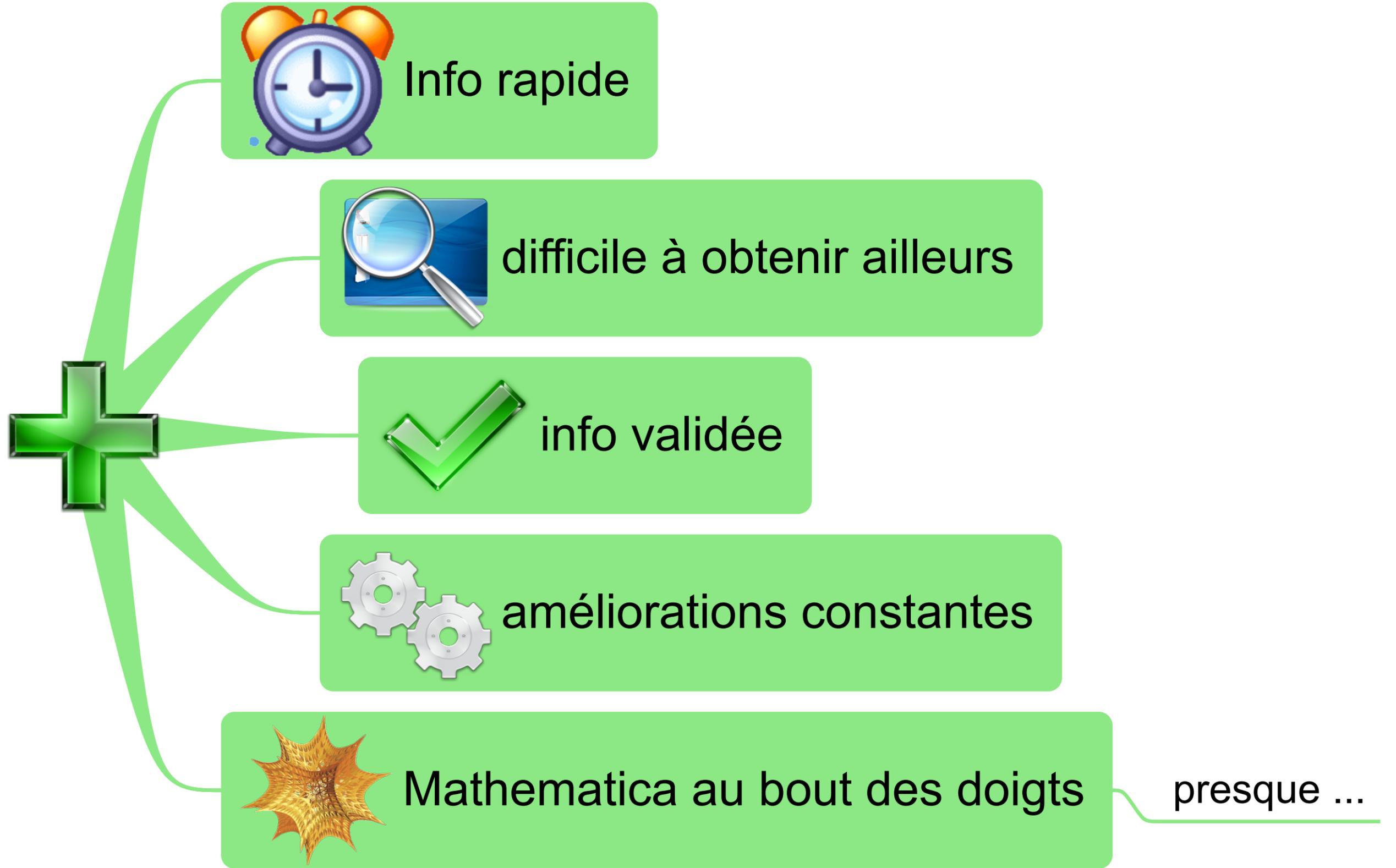
- » PRO: Data Input
- » PRO: Image Input
- » PRO: File Upload
- » PRO: CDF Interactivity
- » Mathematics
- » Statistics & Data Analysis
- » Physics
- » Chemistry
- » Materials
- » Engineering
- » Astronomy
- » Earth Sciences
- » Life Sciences
- » Computational Sciences
- » Units & Measures
- » Dates & Times

Specific examples under "Applied Mathematics":

- Optimization »**
minimize or maximize a function
Input: `maximize x(1-x)e^x`
- minimize or maximize a function of several variables
Input: `maximize 5 + 3x - 4y - x^2 + x y - y^2`
- minimize or maximize a function subject to a constraint
Input: `maximize e^x sin y on x^2+y^2=1`
- Numerical Analysis »**
find roots of an equation using Newton's method
Input: `using Newton's method solve x cos x = 0`
- numerically integrate functions that cannot be integrated symbolically
Input: `integrate sin(cos x) from x=0 to 1`

At the bottom, a status bar shows a link: "Aller à 'http://www.wolframalpha.com/examples/Math.html'"





Crédits :

Les propos tenus dans cet atelier n'engagent que leurs auteurs en leur nom propre, et non les institutions qui les emploient, ni les Bibliothèques de l'UJF et de Grenoble INP.

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