

Calcul de primitives

```
> load("integration.mc")$
```

Dans la suite, nous allons supposer a strictement positif.

```
> assume(a>0)$
```

```
> primitive(1/(x^2+a^2),x);
```

$$\int \frac{1}{x^2 + a^2} dx = \frac{\text{Arctan}\left(\frac{x}{a}\right)}{a}$$

```
> primitive(1/(x^2-a^2),x);
```

$$\int \frac{1}{x^2 - a^2} dx = \frac{\ln(x - a)}{2a} - \frac{\ln(x + a)}{2a}$$

```
> primitive(1/sqrt(x^2+a^2),x);
```

$$\int \frac{1}{\sqrt{x^2 + a^2}} dx = \text{Argsh}\left(\frac{x}{a}\right)$$

```
> primitive(sqrt(x^2-a^2)/x,x);
```

$$\int \frac{\sqrt{x^2 - a^2}}{x} dx = a \text{Arcsin}\left(\frac{a}{|x|}\right) + \sqrt{x^2 - a^2}$$

```
> primitive(1/sin(x)^2,x);
```

$$\int \frac{1}{\sin^2 x} dx = -\frac{1}{\tan x}$$

```
> primitive(1/sin(x),x);
```

$$\int \frac{1}{\sin x} dx = \frac{\ln(\cos x - 1)}{2} - \frac{\ln(\cos x + 1)}{2}$$

Le résultat devrait se simplifier, nous allons écrire une *règle* pour MAXIMA.

```
> strig3(e,v) := ev(e,
  log(cos(v)-1) = 2*log(abs(tan(v/2))) + log(cos(v)+1),
  log(sin(v)-1) = -2*log(abs(tan(v/2+%pi/4))) + log(sin(v)+1))$
```

```
> primitiveSimp(1/sin(x),x,strig3,radcan);
```

$$\int \frac{1}{\sin x} dx = \ln \left| \tan \left(\frac{x}{2} \right) \right|$$

C'est mieux! Pour la suivante cela devrait aller..

```
> primitiveSimp(1/cos(x),x,strig3,radcan);
```

$$\int \frac{1}{\cos x} dx = \ln \left| \tan \left(\frac{2x + \pi}{4} \right) \right|$$

```
> expand(primitive(sin(x)^3/sqrt(cos(x)),x));
```

$$\int \frac{\sin^3 x}{\sqrt{\cos x}} dx = \frac{2 (\cos x)^{\frac{5}{2}}}{5} - 2\sqrt{\cos x}$$