20181012a Ryacas basics

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library(Ryacas)

## Common functions in Ryacas

### 

### yacas()

a = yacas(expression(x^2+1))  
b = expression(x^2+1)  
class(a)

## [1] "yacas"

class(b)

## [1] "expression"

### 

### Eval()

a = yacas(expression(x^2+1))  
Eval(a,list(x=9))

## [1] 82

Eval(a,list(x=c(1:9)))

## [1] 2 5 10 17 26 37 50 65 82

### 

### yacas expressions

# i.e. the quotation ''  
# inside the quotation would be the expressions which is considered non-proper R expressions  
d = yacas('D(x)Sin(x)')  
print(d)

## expression(cos(x))

### 

### Sym()

x = Sym('x') # remember the quotation  
x + 10 # operations on Sym Objects directly without yacas()

## expression(x + 10)

# One can apply sin, cos, tan, deriv, integrate and other functions to Sym objects  
deriv(2\*x^2,x)

## expression(4 \* x)

### 

## Simple Yacas calculations

### 

### Set() or n:=

#### For global variables

yacas('n:=Cos(x)')

## expression(cos(x))

yacas('n')

## expression(cos(x))

yacas('n:=n+n')

## expression(2 \* cos(x))

yacas('Set(m,Sin(x))')

## expression(TRUE)

yacas('m')

## expression(sin(x))

yacas('m+m')

## expression(2 \* sin(x))

# Remerber the global variables cannot be printed

### Further application for Set()

#### assuming we would like to calculate area = pi \* r^2

pi = Sym('pi')  
r = Sym('r')  
# Suppose r = 2  
Set(pi,3.14)

## expression(3.14)

Set(r,2)

## expression(2)

pi \* r^2

## expression(12.56)

### 

### Clear()

#### Note that after clearing a variable (with both Set and Sym applied), the Sym would remain

pi

## expression(3.14)

Clear(pi)

## expression(TRUE)

pi

## expression(pi)

### 

### N()

#### Returning the exact value

#### (otherwise it would remain a rational number)

yacas('9/5')

## expression(9/5)

yacas('N(9/5)')

## expression(1.8)

# precision in N()  
yacas('N(Exp(1),5)')

## expression(2.71828)

### 

### %

#### Results from the previous line

yacas('(1+x)^3')

## expression((x + 1)^3)

yacas('%')

## expression((x + 1)^3)

k = Sym('%')  
k

## expression((x + 1)^3)

### 

### PrettyForm()

yacas('%')

## expression((x + 1)^3)

yacas('PrettyForm(%)')

##   
## 3  
## ( x + 1 )