Code utility

appVersion(4) = "1.0.8238.30484"

Code

Sintaxis

Sintaxis Code take the script in the description and try to convert it into a SMath function

```
test(a,b#) // fn name
// Code
x:a+1
y:b#-1 // subs # by local
cond:1

// while loop
while cond1
  // for loop
  for k,rng
    r:19
    s:20
    try a
      b
  if cond2 // if(2)
    t:21
  if cond3 // if(3)
    t:21
  else
    u:22
  if cond4 // f(4)
    t:21
  elif cond4'
    u:22
  else
    v#:23

m:mat( ... // continue
 x,y, ...  // in
 r,s, ...  // next line
 2,2)

m+v#
```

$test := 1$

$C := Code(\text{description}(test))$ $C = \text{"line(test(a,b\_local\_test):line}$

$$
\begin{aligned}
\Rightarrow\ & test(a, b\_local\_test) := \\
& \quad x := a + 1 \\
& \quad y := b\_local\_test - 1 \\
& \quad cond := 1 \\
& \quad \text{while } cond1 \\
& \quad\quad \text{for } k \in rng \\
& \quad\quad\quad r := 19 \\
& \quad\quad\quad s := 20 \\
& \quad\quad\quad \text{try} \\
& \quad\quad\quad\quad a \\
& \quad\quad\quad \text{on error} \\
& \quad\quad\quad\quad b \\
& \quad\quad \text{if } cond2 \\
& \quad\quad\quad t := 21 \\
& \quad\quad \text{if } cond3 \\
& \quad\quad\quad t := 21 \\
& \quad\quad \text{else} \\
& \quad\quad\quad u := 22 \\
& \quad\quad \text{if } cond4 \\
& \quad\quad\quad t := 21 \\
& \quad\quad \text{else if } cond4' \\
& \quad\quad\quad u := 22 \\
& \quad\quad \text{else} \\
& \quad\quad\quad v\_local\_test := 23 \\
& \quad m := \begin{bmatrix} x & y \\ r & s \end{bmatrix} \\
& \quad m + v\_local\_test
\end{aligned}
$$

Examples

```
RREF(M) // Rew reduced echelon form
r:1 & c:1 // use and or stack() for
A:M & B:A // simulate line break
m:rows(A) & n:cols(A)

ro:range(1,m)
while (r≤m)&(c≤n)
  if el(A,r,c)≡0
    h:range(r,m)
    el(A,h,c):0
    c:c+1
  else
    k:range(c,n)
    f:el(A,r,c)
    el(A,r,k):el(A,r,k)/f
    el(B,ro,k):el(A,ro,k)- ...
      if(ro≠r,el(A,ro,c)*el(A,r,k),0)
    el(A,ro,k):el(B,ro,k)
    r:r+1 & c:c+1
A
```

$RREF := 1$

$\text{str2num}(Code(\text{description}(RREF))) = 1$

$$M := \text{augment}\left(\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}, \text{identity}(3)\right)$$

$$RREF(M) = \begin{bmatrix} 1 & 0 & -1 & 0 & -2.6667 & 1.6667 \\ 0 & 1 & 2 & 0 & 2.3333 & -1.3333 \\ 0 & 0 & 0 & 1 & -2 & 1 \end{bmatrix}$$

```
Bisection(f(1),α,β,ε) // Bisection method
a:α & b:β
fa:f(a) & fb:f(b)
if sign(fa)*sign(fb)>0
  error("Wrong interval")
else
  if fa≡0
    c:a
  else
    if fb≡0
      c:b
    else
      N:1+trunc(log(abs({b-a}/ε),2))
      for iter, range(1,N)
        c:{a+b}/2 & fc:f(c)
        if fc≡0
          break
        else
          if sign(fa)*sign(fc)>0
            a:c & fa:fc
          else
            b:c & fb:fc
c
```

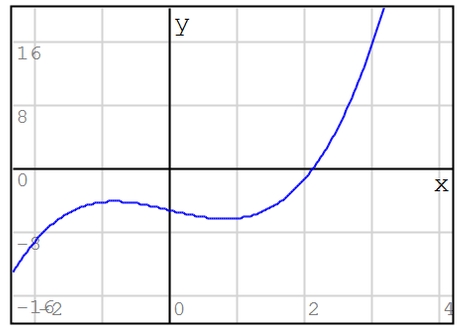
$Bisection := Bisection$

If the name is undefined, can use it instead description()

$\mathrm{str2num}(Code(Bisection)) = 1$

$f(x) := x^3 - 2 \cdot x - 5$

$Bisection\left(f(x), 1, 4, 10^{-7}\right) = 2.0946$



$f(x)$

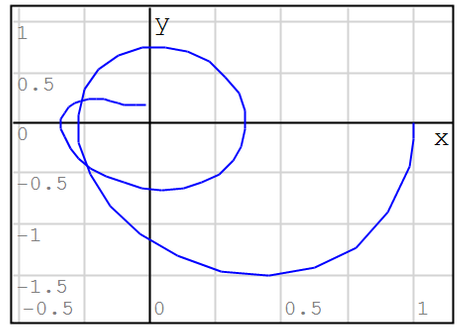
```
RK(D#(2),xo#,to#,te#,N#,ε#)

// Runge-Kutta method
// with adaptive step

X#:xo#
h#:{te#-to#}/{N#+1}
for t#:to#+h#,t#≤te#+to#+h#,t#:t#+h#
  x#:col(X#,cols(X#))
  k1#:h#/3*eval(D#(t#,x#))
  k2#:h#/3*eval(D#(t#+h#/3,x#+k1#))
  k3#:h#/3*eval(D#(t#+h#/3,x#+{k1#+k2#}/2))
  k4#:h#/3*eval(D#(t#+h#/2,x#+{3*k1#+9*k3#}/8))
  k5#:h#/3*eval(D#(t#+h#,x#+{3*k1#-9*k3#}/2+6*k4#))
  δ#:k1#-9/2*k3#+4*k4#-1/2*k5#
  if normi(δ#)≤5*ε#
    X#:augment(X#,x#+1/2*(k1#+4*k4#+k5#))
    el(T#,1,cols(X#)):t#
    h#:h#*2
  else
    t#:t#-h#
    h#:h#/2
transpose(stack(T#,X#))
```

$RK := RK$

$\mathrm{str2num}(Code(RK)) = 1$

$$D(t, x) := \begin{bmatrix} x_2 \\ -\left(5 \cdot x_1 + x_2 - \sin(t)\right) \end{bmatrix}$$

$$RK := RK\left(D(t, x), \begin{bmatrix} 1 \\ 0 \end{bmatrix}, 0, 6, 200, 10^{-5}\right)$$



$\mathrm{augment}(\mathrm{col}(RK, 2), \mathrm{col}(RK, 3))$

---

new if

$$IF2(x) := \begin{array}{l}\text{if } x > 0 \\ \quad \ln(x)\end{array}$$

$$IF3(x) := \begin{array}{l}\text{if } x > 0 \\ \quad \ln(x) \\ \text{else} \\ \quad \ln(-x)\end{array}$$

$$IF4(x) := \begin{array}{l}\text{if } x > 0 \\ \quad \ln(x) \\ \text{else if } x < 0 \\ \quad \ln(-x) \\ \text{else} \\ \quad -\infty\end{array}$$

```
if2(x)

if x>0
  ans:ln(x)
ans
```

$if2 := if2$

```
if3(x)

if x>0
  ans:ln(x)
else
  ans:ln(-x)
ans
```

$if3 := if3$

```
if4(x)

if x>0
  ans:ln(x)
elif x<0
  ans:ln(-x)
else
  ans:-∞
ans
```

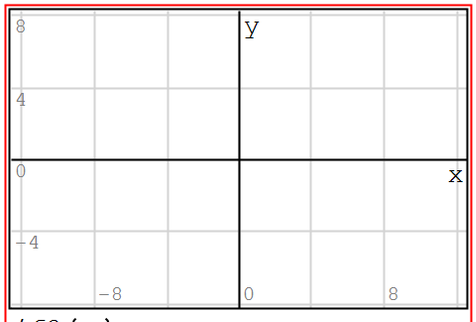
$if4 := if4$

$\text{str2num}(\text{Code}(if2)) = 1$

$if2(3) = 1.0986$

$if2(-3) = \blacksquare$

$if2(0) = \blacksquare$



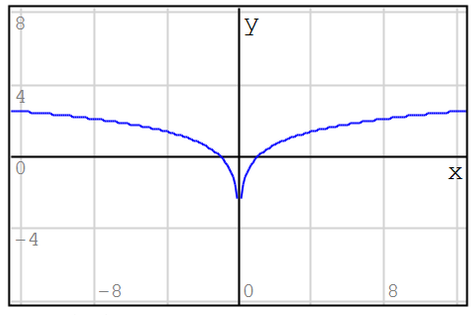
$if2(x)$

$\text{str2num}(\text{Code}(if3)) = 1$

$if3(3) = 1.0986$

$if3(-3) = 1.0986$

$if3(0) = \blacksquare$



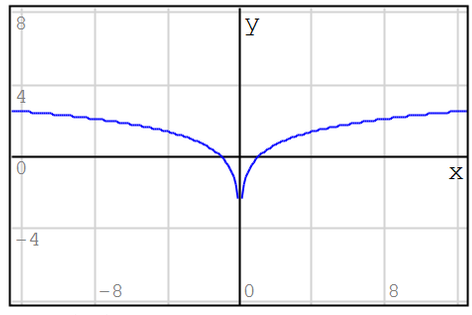
$if3(x)$

$\text{str2num}(\text{Code}(if4)) = 1$

$if4(3) = 1.0986$

$if4(-3) = 1.0986$

$if4(0) = -\infty$



$if4(x)$

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