KIT

de sobrevivencia em

CALCULO

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# Somas de Riemann

**Sintaxe: animRiemann(f,x=a..b); ou,**

**animRiemann(f,x=a..b,opts);**

**PARAMETROS: f - uma função ou expressão,**

**x - a variavel de f,**

**a,b - números reais (a<b) especificando a variação,**

**opts - opcoes extra,**

**Resumo:**

**- O procedimento chama uma sequência animada mostrando a soma de Riemann,**

**dando a melhor aproximação e a área sob a curva.**

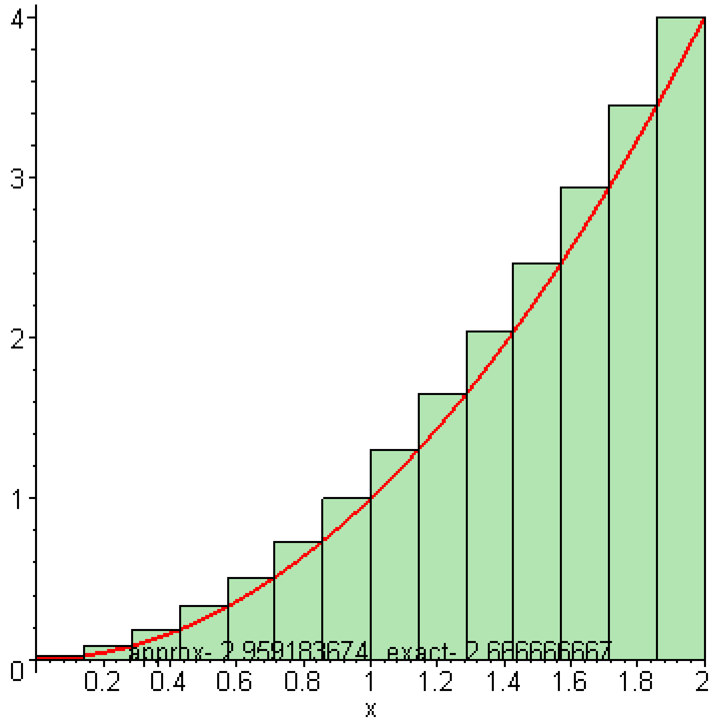
**- Opções extras são accuracy = m onde m é algum real positivo e frames = n onde n é algum inteiro positivo especificando o numero maximo de retangulos sob a função. Os defaults são accuracy = .1, frames = 50, e somas médias.**

**Execute o procedimento e faça os exemplos.**

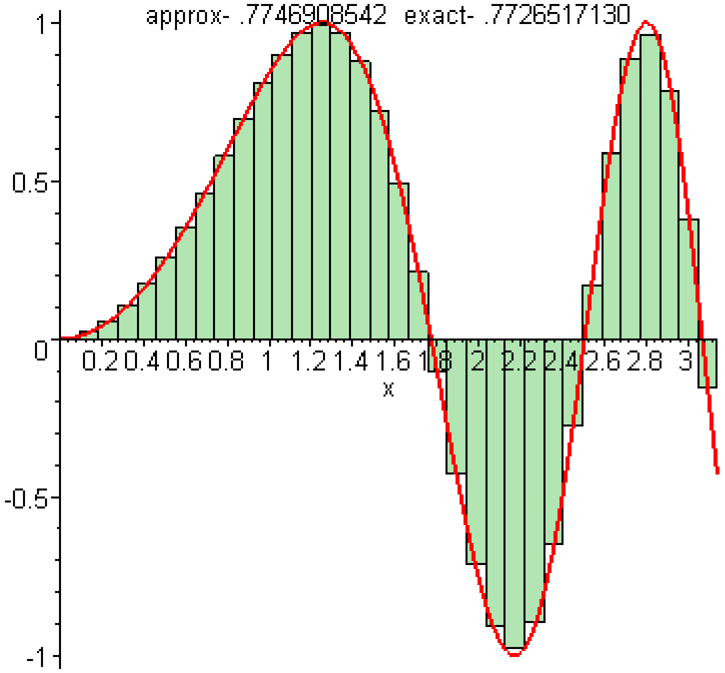
## O Procedimento (execute-o)

## Exemplos

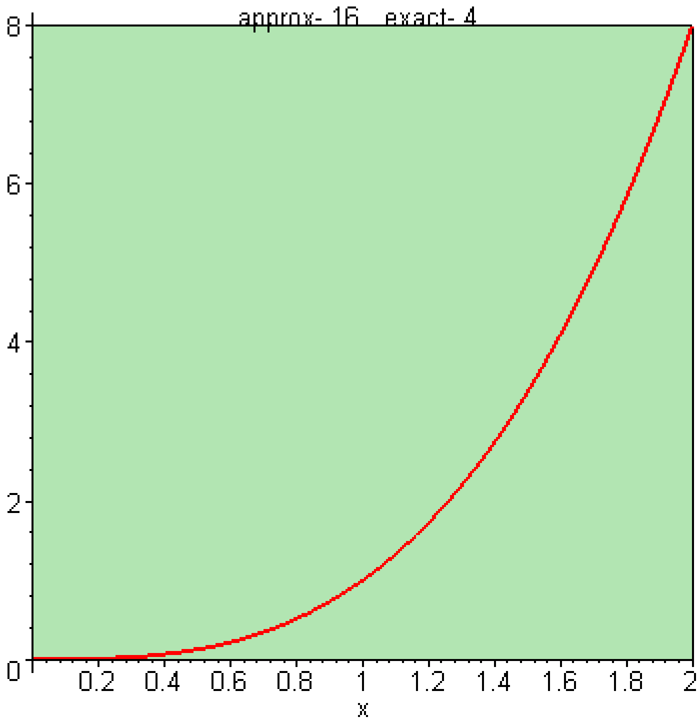
```
> animRiemann(x^2,x=0..2,frames=20,right);
```



```
> animRiemann(sin(x^2),x=0..Pi,frames=40,midle);
```



```
> animRiemann(x^3,x=0..2,frames=30,right);
```


approx- 16 exact- 4
8
6
4
2
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
x

```
>
```

# O Procedimento (execute-o)

```
> animRiemann := proc ()

> local i,f, range, the_var, max_frames, acc, type_of_plot, v, the_value,L,

> n, num_frames, low_value, high_value, the_maximum;

> # standard assignments

> f := args[1];

> range := args[2];

> the_var := convert(range,list)[1];

> low_value := convert(convert(range,list)[2],list)[1];

> high_value := convert(convert(range,list)[2],list)[2];

> max_frames := 50;

>

> # defaults for options (will be this if no option given)

> acc:= .1;

> type_of_plot := middle;

> num_frames := 50;

>

> for i from 3 to nargs do

> ### WARNING: semantics of type `string` have changed
if type(args[i],string) then

> if args[i]='middle' then type_of_plot:=middle fi;

> if args[i]='right' then type_of_plot:=right fi;

> if args[i]='left' then type_of_plot:=left fi;

> fi;

> if type(args[i],`=`) then

> if convert(args[i],list)[1]='frames' then

> if type(convert(args[i],list)[2],integer) then
> num_frames := convert(args[i],list)[2];
> acc := .00000001;
> else
> ERROR(`Number of frames must be an integer!`)
> fi;
> fi;
> if convert(args[i],list)[1]='accuracy' then
> acc := convert(args[i],list)[2];
> num_frames := 1000;
> fi;
> fi;
> od;
>
> # now for the hard part...
> # here is the actual value
> # assuming that the integral can be evaluated
>
> the_value := int(f,range);
>
> # decide where to put the values on the graph
> the_maximum := evalf(maximize(f,the_var,evalf(low_value)..evalf(high_value)));
>
> # here is the left plot
> if type_of_plot = left then
> v := student[leftsum](f,range,1);
> L := plots[display]({student[leftbox](f,range,1),plots[textplot]
> ([(high_value-low_value)/2,the_maximum,cat(`approx- `,
> ### WARNING: semantics of type `string` have changed
convert(evalf(v),string),` exact- `,convert(evalf(the_value),

> ### WARNING: semantics of type `string` have changed
string))] ,align=ABOVE)}):

>

> for n from 2

> while evalf(abs(evalf(value(v))-evalf(the_value)))>evalf(acc)

> do

> if evalf(n) > evalf(num_frames) or n = max_frames then break fi;

> v := student[leftsum](f,range,n);

> L := L,plots[display]({student[leftbox](f,range,n),plots[textplot]

> ([(high_value-low_value)/2,the_maximum,cat(`approx- `,

> ### WARNING: semantics of type `string` have changed
convert(evalf(v),string),` exact: `,convert(evalf(the_value),

> ### WARNING: semantics of type `string` have changed
string))] ,align=ABOVE)}):

> od;

> fi;

> # here is the middle plot

> if type_of_plot = middle then

> v := student[middlesum](f,range,1);

> L := plots[display]({student[middlebox](f,range,1),plots[textplot]

> ([(high_value-low_value)/2,the_maximum,cat(`approx- `,

> ### WARNING: semantics of type `string` have changed
convert(evalf(v),string),` exact- `,convert(evalf(the_value),

> ### WARNING: semantics of type `string` have changed
string))] ,align=ABOVE)}):

>

> for n from 2
>  while evalf(abs(evalf(value(v))-evalf(the_value)))>evalf(acc)
>  do
>  if evalf(n) > evalf(num_frames) or n = max_frames then break fi;
>  v := student[middlesum](f,range,n);
>  L := L,plots[display]({student[middlebox](f,range,n),plots[textplot]
>  ([(high_value-low_value)/2,the_maximum,cat(`approx- `,
>  ### WARNING: semantics of type `string` have changed
convert(evalf(v),string),` exact- `,convert(evalf(the_value),
>  ### WARNING: semantics of type `string` have changed
string))] ,align=ABOVE)}):
>  od;
>  fi;
>
>  # here is the right plot
>  if type_of_plot = right then
>  v := student[rightsum](f,range,1);
>  L := plots[display]({student[rightbox](f,range,1),plots[textplot]
>  ([(high_value-low_value)/2,the_maximum,cat(`approx- `,
>  ### WARNING: semantics of type `string` have changed
convert(evalf(v),string),` exact- `,convert(evalf(the_value),
>  ### WARNING: semantics of type `string` have changed
string))] ,align=ABOVE)}):
>
>  for n from 2
>  while evalf(abs(evalf(value(v))-evalf(the_value)))>evalf(acc)
>  do
>  if evalf(n) > evalf(num_frames) or n = max_frames then break fi;
>  v := student[rightsum](f,range,n);
>  L := L,plots[display]({student[rightbox](f,range,n),plots[textplot]
>  ([(high_value-low_value)/2,the_maximum,cat(`approx- `,

>  ### WARNING: semantics of type `string` have changed
convert(evalf(v),string),` exact- `,convert(evalf(the_value),

>  ### WARNING: semantics of type `string` have changed
string))] ,align=ABOVE)}):

>  od;

>  fi;

>  plots[display]([L],insequence=true);

>  end:
```