

Figure 1: Maxima <http://maxima.sourceforge.net/>

Maxima kao kalkulator

```
(%i1) 1+1;
```

```
(%o1) 2
```

```
(%i2) 2/4;
```

```
(%o2)  $\frac{1}{2}$ 
```

```
(%i3) 10*3;
```

```
(%o3) 30
```

```
(%i4) %;
```

```
(%o4) 30
```

```
(%i5) % - 10;
```

```
(%o5) 20
```

```
(%i6) %o5 * 3;
```

```
(%o6) 60
```

float() -> floating point numbers

```
(%i7) float(1/6);
```

```
(%o7) 0.16666666666666667
```

```
(%i8) 1/6.0;
```

```
(%o8) 0.16666666666666667
```

```
(%i9) 12^20;
```

```
(%o9) 3833759992447475122176
```

```
(%i10) 12.0^20;
```

```
(%o10) 3.833759992447475 1021
```

```
(%i11) 11!;
```

```
(%o11) 39916800
```

Константе и основне математичке функције

%e – Euler's Number

%pi – pi

%i – the imaginary unit

inf – real positive infinity

minf – real minus infinity

infinity – complex infinity

```
(%i12) %e;
```

```
(%o12) %e
```

```
(%i13) %pi
```

```
;
```

```
(%o13) %pi
```

```
(%i14) %i;
```

```
(%o14) %i
```

```
(%i15) sin(%pi/2) + cos(%pi/3);
```

```
(%o15)  $\frac{3}{2}$ 
```

```
(%i16) tan(%pi/6) * cot(%pi/6);
```

```
(%o16) 1
```

```
(%i17) float(sec(%pi/3) + csc(%pi/3));
```

```
(%o17) 3.154700538379251
```

```
(%i18) sqrt(121);
```

```
(%o18) 11
```

```
(%i19) log(%e);
```

```
(%o19) 1
```

Дефинисање функција и променљивих

```
(%i21) x:10; y:15;
```

```
(%o20) 10
```

```
(%o21) 15
```

```
(%i22) sqrt(x^2+y^2);
```

```
(%o22)  $5\sqrt{13}$ 
```

```
(%i23) f(x):=x^3-x+1;
```

```
(%o23)  $f(x) := x^3 - x + 1$ 
```

```
(%i24) f(2);
```

```
(%o24) 7
```

```
(%i25) f(x);
```

```
(%o25) 991
```

```
(%i26) f(y);
```

```
(%o26) 3361
```

```
(%i27) log10(x):=log(x)/log(10);
```

```
(%o27) log10(x):=
$$\frac{\log(x)}{\log(10)}$$

```

```
(%i28) log10(10);
```

```
(%o28) 1
```

Рад са општим бројевима - симболичко израчунавање

```
(%i29) factor(30!);
```

```
(%o29)  $2^{26} 3^{14} 5^7 7^4 11^2 13^2 17 19 23 29$ 
```

```
(%i30) factor(a^2 + a - 6);
```

```
(%o30) (a-2) (a+3)
```

```
(%i31) expand((a+3)^4);
```

```
(%o31)  $a^4 + 12a^3 + 54a^2 + 108a + 81$ 
```

```
(%i32) ratsimp((a^2-1)/(a+1));
```

```
(%o32) a-1
```

```
(%i33) trigsimp(2*cos(a)^2 + sin(a)^2);
```

```
(%o33)  $\cos(a)^2 + 1$ 
```

```
(%i34) trigexpand(sin(2*a)+cos(2*a));
```

```
(%o34)  $-\sin(a)^2 + 2\cos(a)\sin(a) + \cos(a)^2$ 
```

Решавање система једначина

```
(%i35) solve(a^2-4,a);
```

```
(%o35) [a=-2, a=2]
```

```
(%i36) solve(a^3=1,a);
(%o36)  $\left[a = \frac{\sqrt{3}i - 1}{2}, a = -\frac{\sqrt{3}i + 1}{2}, a = 1\right]$ 

(%i37) trigsimp(solve([cos(a)^2 - a = 2 - sin(a)^2], [a]));
(%o37)  $[a = -1]$ 

(%i38) solve([X^2 + Y^2 = 1, Y = X], [X,Y]);
(%o38)  $\left[\left[X = -\frac{1}{\sqrt{2}}, Y = -\frac{1}{\sqrt{2}}\right], \left[X = \frac{1}{\sqrt{2}}, Y = \frac{1}{\sqrt{2}}\right]\right]$ 

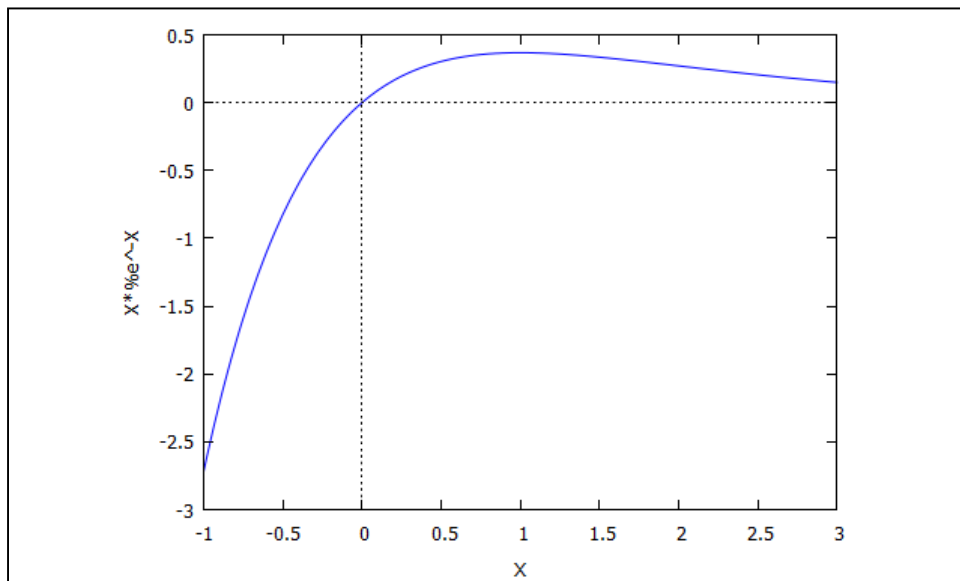
(%i39) linsolve([a - 2*b = 14, a + 3*b = 9], [a,b]);
(%o39)  $[a = 12, b = -1]$ 
```

Приказ графика

```
(%i40) plot2d(X*(%e)^(-X), [X,-1,3]);
(%o40)  $[$   

 $C:/Users/korisnik/AppData/Local/Temp/maxout5864.gnuplot]$ 
```

Figure 2: Приказ функције

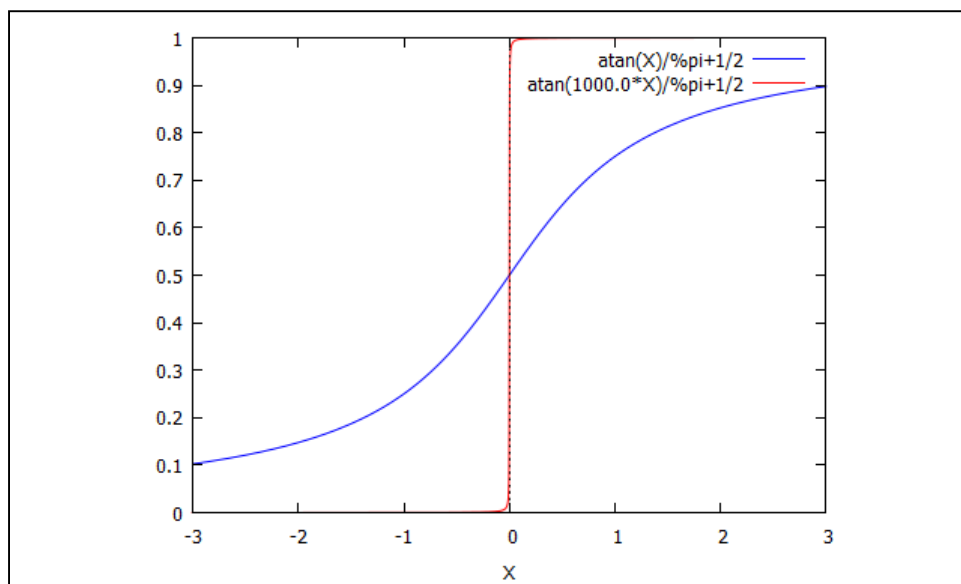


```
(%i41) f1X: (1/2) + (1/%pi) * atan(X);
(%o41)  $\frac{\operatorname{atan}(X)}{\pi} + \frac{1}{2}$ 

(%i42) f2X: (1/2) + (1/%pi) * atan(X/0.001);
(%o42)  $\frac{\operatorname{atan}(1000.0 X)}{\pi} + \frac{1}{2}$ 
```

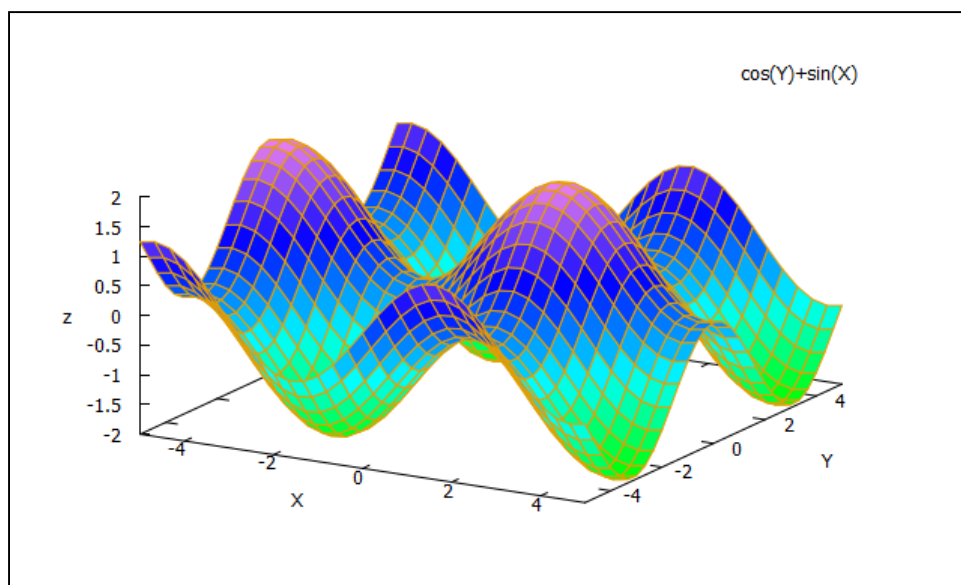
```
(%i43) plot2d([f1X, f2X], [X, -3, 3]);
(%o43) [
C:/Users/korisnik/AppData/Local/Temp/maxout5864.gnuplot ]
```

Figure 3: Приказ више функција



```
(%i45) f(X,Y) := sin(X) + cos(Y);
plot3d(f(X,Y), [X,-5,5], [Y,-5,5]);
(%o44) f(X,Y) := sin(X) + cos(Y)
(%o45) [
C:/Users/korisnik/AppData/Local/Temp/maxout5864.gnuplot ]
```

Figure 4: Тростандардни приказ



Гранична вредност

```
(%i46) limit((1+1/X)^X, X, inf);
(%o46) %e
```

```
(%i47) limit(sin(X)/X,X,0);
(%o47) 1

(%i48) limit(atan(X),X,inf);
(%o48)  $\frac{\pi}{2}$ 

(%i49) limit(atan(X),X,minf);
(%o49)  $-\frac{\pi}{2}$ 

(%i50) limit(log(X),X,0,plus);
(%o50)  $-\infty$ 

(%i51) limit(sqrt(-X)/X,X,0,minf);
(%o51)  $-\infty$ 
```

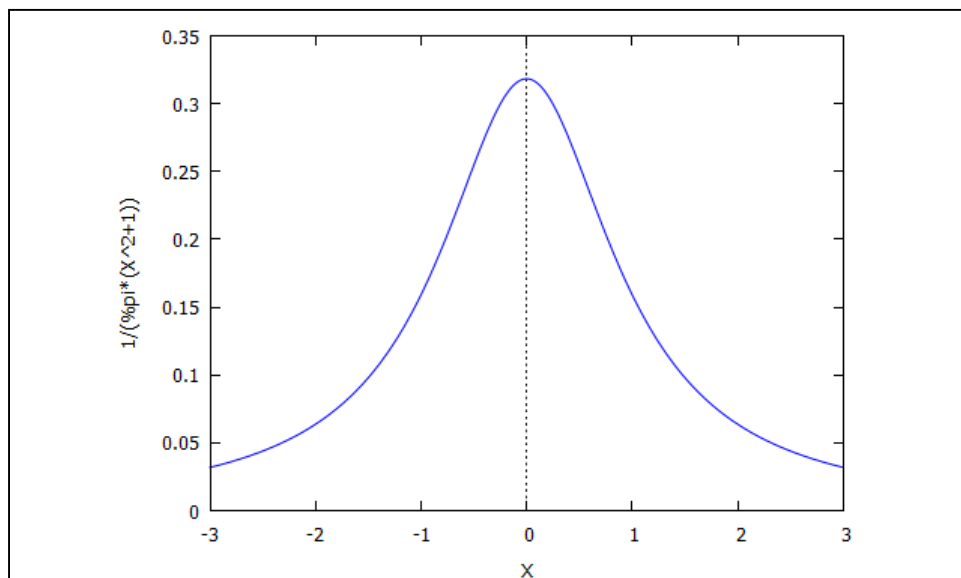
Изводи

```
(%i52) diff(cos(X), X);
(%o52)  $-\sin(X)$ 

(%i53) d1X: diff(f1X, X);
(%o53)  $\frac{1}{\pi(X^2+1)}$ 

(%i54) plot2d([d1X], [X,-3,3]);
(%o54) [
  C:/Users/korisnik/AppData/Local/Temp/maxout5864.gnuplot ]
```

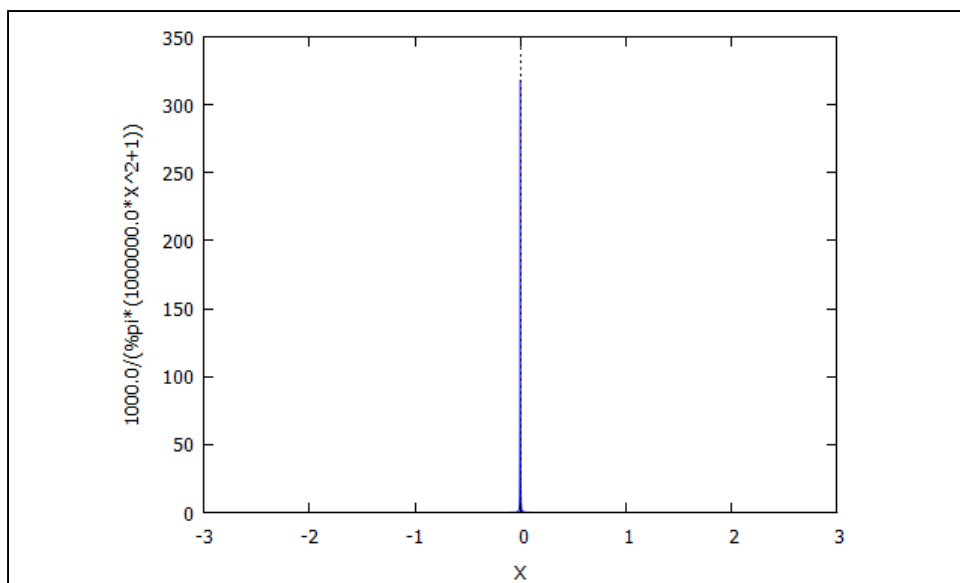
Figure 5: Приказ функције



```
(%i55) d2X: diff(f2X, X);
(%o55) 
$$\frac{1000.0}{\%pi (1000000.0 X^2 + 1)}$$

(%i56) plot2d([d2X], [X, -3, 3]);
(%o56) [
C:/Users/korisnik/AppData/Local/Temp/maxout5864.gnuplot ]
```

Figure 6: Апроксимација Диракове - делта функције
елементарном функцијом



```
(%i57) diff(tan(X), X, 4);
(%o57) 
$$8 \sec(X)^2 \tan(X)^3 + 16 \sec(X)^4 \tan(X)$$

```

Интеграли

```
(%i58) integrate(d1X, X);
(%o58) 
$$\frac{\operatorname{atan}(X)}{\%pi}$$

(%i59) integrate(2*X, X, 0, 1);
(%o59) 1
(%i60) integrate(sin(X), X, 0, 1);
(%o60) 1 - cos(1)
(%i61) integrate(sin(X), X, 0, sqrt(2));
(%o61) 1 - cos(\sqrt{2})
```

```
(%i62) integrate (X+2/(X -3), X, 0,1);
```

```
(%o62)  $-2 \log (3)+2 \log (2)+\frac{1}{2}$ 
```

```
(%i63) integrate (%e^(-X^2), X, minf, inf);
```

```
(%o63)  $\sqrt{\pi}$ 
```

Суме и производи

```
(%i64) sum(k, k, 1, n);
```

```
(%o64)  $\sum_{k=1}^n (k)$ 
```

```
(%i65) sum(k, k, 1, n), simpsum;
```

```
(%o65)  $\frac{n^2+n}{2}$ 
```

```
(%i66) sum(1/(2^k), k, 0, inf), simpsum;
```

```
(%o66) 2
```

```
(%i67) fact(n):=product(k, k, 1, n);
```

```
(%o67)  $fact(n) := \prod_{k=1}^n (k)$ 
```

```
(%i68) fact(8);
```

```
(%o68) 40320
```

Развој у ред

```
(%i69) taylor(%e^X, X, 0, 5);
```

```
(%o69) /T/  $1+X+\frac{X^2}{2}+\frac{X^3}{6}+\frac{X^4}{24}+\frac{X^5}{120}+\dots$ 
```

Погледајте ПОМОЋ - HELP за наведене функције!