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```
%- - 02/18/2020 02:36:52 PM --%
mkdir lab2
cd lab2
diary lab2_diary
```

Warning: Directory already exists.

Simboliska matematika

Piemers

```
syms a11 a12 a21 a22
A=[a11 a12 ; a21 a22]
syms b11 b12 b21 b22
B=[b11 b12 ; b21 b22]
C=A*B
D=A.*B
```

```
A =

[ a11, a12]
[ a21, a22]

B =

[ b11, b12]
[ b21, b22]
```

```
C =  
  
[ a11*b11 + a12*b21, a11*b12 + a12*b22]  
[ a21*b11 + a22*b21, a21*b12 + a22*b22]
```

```
D =  
  
[ a11*b11, a12*b12]  
[ a21*b21, a22*b22]
```

Simblisku mainigo definesana

1. veids

```
x=sym('x');  
x=sym('y');  
x=sym('x');  
y=sym('y');  
sqrt(x^2)
```

```
ans =
```

```
x
```

pienemsim ka x ir lielaks par 0

```
x=sym('x','positive');  
sqrt(x^2)  
% 2.veids  
syms a11 a12 a21 a22  
A=[a11 a12 ; a21 a22];  
A'
```

```
ans =
```

```
x
```

```
ans =
```

```
[ a11, a21]  
[ a12, a22]
```

pienemsim ka a11 a12 a21 a22 ir reali

```
syms a11 a12 a21 a22 real  
A'
```

```
ans =
```

```
[ a11, a21]  
[ a12, a22]
```

3.veids

```
A=sym('a',[3 4])
```

```
A =
```

```
[ a1_1, a1_2, a1_3, a1_4]
[ a2_1, a2_2, a2_3, a2_4]
[ a3_1, a3_2, a3_3, a3_4]
```

atvasinasana

```
syms x
diff(x^2)
```

ans =

2*x

parcialie atvasinajumi

```
syms x y
z = x^5+y^4;
diff(z,x)
diff(z,y)
```

ans =

5*x^4

ans =

4*y^3

Integresana**Nenoteiktais integralis**

```
int(x^2,x)
syms a x
int(x^2,a)
```

ans =

x^3/3

ans =

a*x^2

Noteiktais integralis

```
syms x
int(x^2,x,-3,3)
```

ans =

18

Robezas

```
%limit()
syms x
```

```
limit (1/(x-1),x,1,'left')  
limit (1/(x-1),x,1,'right')
```

ans =

-Inf

ans =

Inf

Vienadojumu risinasana

```
syms x  
solve(x^2-5*x+6==0,x)
```

ans =

2
3

vienadojumu sistemas

```
syms x y z  
atb = solve(x+y+z==21,x+y-z==1,x-y+z==9)  
atb.x  
atb.y  
atb.z
```

atb =

struct with fields:

```
x: [1x1 sym]  
y: [1x1 sym]  
z: [1x1 sym]
```

ans =

5

ans =

6

ans =

10

izteiksmju vienkarsosana

```
syms x  
y=(x-1)*(x-2)/((x-3)*(x-4^2))  
yd = diff(y)  
yd  
simplify(yd)
```

y =

((x - 1)*(x - 2))/((x - 3)*(x - 16))

```
yd =  
  
(x - 1)/((x - 3)*(x - 16)) + (x - 2)/((x - 3)*(x - 16)) - ((x - 1)*(x - 2))/((x - 3)*(x - 16)^2) - ((x - 1)*(x - 2))/((x - 3)^2*(x - 16))  
  
yd =  
  
(x - 1)/((x - 3)*(x - 16)) + (x - 2)/((x - 3)*(x - 16)) - ((x - 1)*(x - 2))/((x - 3)*(x - 16)^2) - ((x - 1)*(x - 2))/((x - 3)^2*(x - 16))  
  
ans =  
  
-(2*(8*x^2 - 46*x + 53))/(x^2 - 19*x + 48)^2
```

izteiksmju vienkarsosana 2

```
syms x  
y=(x-2)*(x-3)  
y2=expand(y)  
factor(y2)  
horner(y)
```

```
y =  
  
(x - 2)*(x - 3)  
  
y2 =  
  
x^2 - 5*x + 6  
  
ans =  
  
[ x - 2, x - 3]  
  
ans =  
  
x*(x - 5) + 6
```

Simboliskas konstantes

```
pi  
format long  
pi  
a=vpa('pi')  
a=vpa('2')  
b=vpa('2')  
a=vpa('pi')  
c=vpa('2')  
a+b+c  
digits(100)  
a=vpa(pi)  
digits(10)  
sqrt(a)  
class(a)  
class(b)
```

```
ans =  
  
3.141592653589793  
  
ans =  
  
3.141592653589793
```

```
a =
3.141592654

a =
2.0

b =
2.0

a =
3.141592654

c =
2.0

ans =
7.141592654

a =
3.141592653589793238462643383279502884197169399375105820974944592307816406286208998628034825342117068

ans =
1.772453851

ans =
'sym'

ans =
'sym'
```

izteiksmju skaistak attelosana

```
y=(x-1)*(x-2)/((x-3)*(x-4)^2);
pretty(y)
```

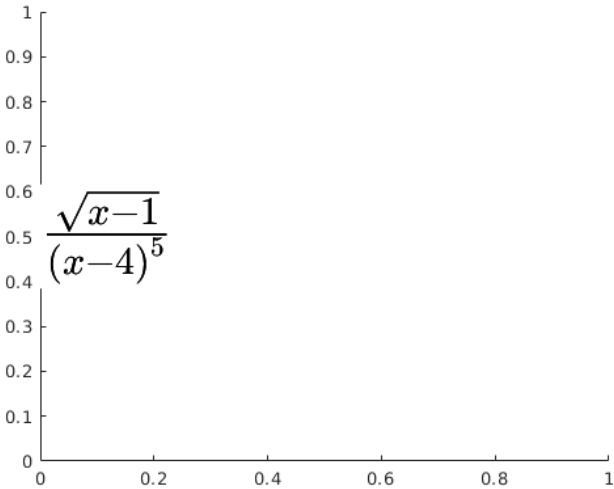
$$\frac{(x - 1) (x - 2)}{(x - 3) (x - 4)^2}$$

izteiksmju skaistak attelosana 2

```
syms x
y = sqrt(x-1)/(x-4)^5;
yltx = latex(y)
yltx2 = ['$ ',yltx,'%']
yltx2 = ['$ ',yltx,'$']
text(0,0.5,yltx2,'Interpreter','latex','FontSize',32,'BackgroundColor','white')
text(0,0.5,yltx2,'Interpreter','latex','FontSize',32,'BackgroundColor','none')
```

```
yltx =
'\frac{\sqrt{x-1}}{{\left(x-4\right)}^5}'
```

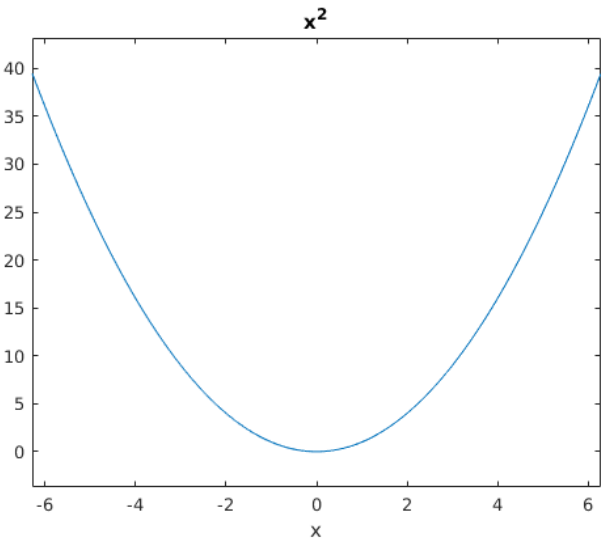
```
yltx2 =  
  
    '$\frac{\sqrt{x-1}}{{\left(x-4\right)}^5}$'  
  
yltx2 =  
  
    '$\frac{\sqrt{x-1}}{{\left(x-4\right)}^5}$'
```



Rezultatu grafiska attelosana

aprekinu veikšana

```
syms x  
y=x^2;  
ezplot(y)
```



aprekinu veikšana

rezultatu grafiska attelosana ar plot

(2.LD 2.uzd)

1.

pienemsims ka ir dota funkcija, kurai ir jaatrod atvasinajums un ta bus jauzime gan funkciju gan atvasinajumu uz grafika izmantojot plot uzdotaja intervala un ar latex bus jaizveido anotaciju(legenda) -a

```
syms x
y=x^3+2*x^2-5*x+4
% 2.
yd = diff(y)
% atradam atvasinajumu
% 3.
% izteiksmes vektorizacija
% (punktinu ieliksana)
yv = vectorize(y)
ydv = vectorize(yd)
```

y =

$x^3 + 2x^2 - 5x + 4$

yd =

$3x^2 + 4x - 5$

yv =

'2.*x.^2 - 5.*x + x.^3 + 4'

ydv =

'4.*x + 3.*x.^2 - 5'

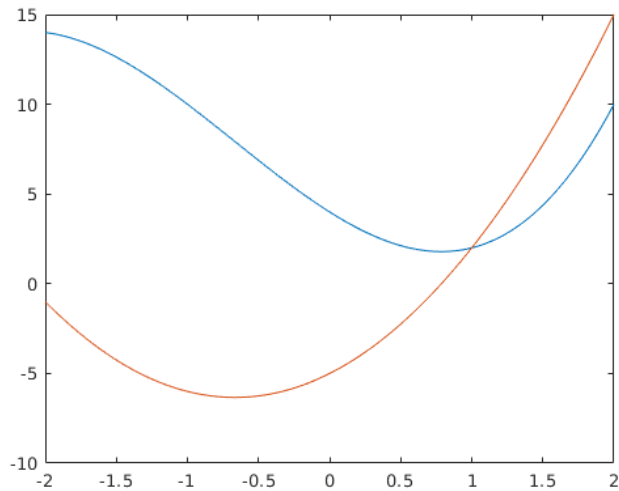
4. definesim x ka skaitlu vektoru

```
x=-2:0.01:2;
yn = eval(yv);
ydn = eval(ydv);
```

tas bija 5. solis kas saucas izteiksmes interpretacija, citiem vardiem, paskatas kas ir x un iliek to

6. soliszimesim ar plot

```
plot(x,yn,x,ydn)
```

7. anotesim grafiku

```
yltx = latex(y);
ydlatxt=latex(yd);
h = legend(['$',yltx,'$'],['$',ydlatxt,'$']),set(h,'Interpreter','Latex')
h = legend(['$',yltx,'$'],['$',ydlatxt,'$'])
h = legend(['$',yltx,'$'],['$',ydlatxt,'$']),...
set(h,'Interpreter','Latex')
plot(x,yn,x,ydn)
h = legend(['$',yltx,'$'],['$',ydlatxt,'$']),set(h,'Interpreter','Latex')
```

h =

Warning: Error updating Legend.

String scalar or character vector must have valid interpreter syntax:
 x^3+2x^2-5x+4

Warning: Error updating Legend.

String scalar or character vector must have valid interpreter syntax:
 $3x^2+4x-5$

Legend (x^3+2x^2-5x+4 , $3x^2+4x-5$) with properties:

```
String: {'$x^3+2\,x^2-5\,x+4$' '$3\,x^2+4\,x-5$'}
Location: 'northeast'
Orientation: 'vertical'
FontSize: 9
Position: [1x4 double]
Units: 'normalized'
```

Use GET to show all properties

h =

Legend (x^3+2x^2-5x+4 , $3x^2+4x-5$) with properties:

```
String: {'$x^3+2\,x^2-5\,x+4$' '$3\,x^2+4\,x-5$'}
Location: 'northeast'
Orientation: 'vertical'
FontSize: 9
Position: [1x4 double]
Units: 'normalized'
```

Use GET to show all properties

h =

Legend (x^3+2x^2-5x+4 , $3x^2+4x-5$) with properties:

```
String: {'$x^3+2\,x^2-5\,x+4$' '$3\,x^2+4\,x-5$'}
Location: 'northeast'
Orientation: 'vertical'
FontSize: 9
Position: [1x4 double]
Units: 'normalized'
```

Use GET to show all properties

h =

Warning: Error updating Legend.

String scalar or character vector must have valid interpreter syntax:
 x^3+2x^2-5x+4

Warning: Error updating Legend.

String scalar or character vector must have valid interpreter syntax:
 $3x^2+4x-5$

Legend (x^3+2x^2-5x+4 , $3x^2+4x-5$) with properties:

```
String: {'$x^3+2\,x^2-5\,x+4$' '$3\,x^2+4\,x-5$'}
Location: 'northeast'
Orientation: 'vertical'
FontSize: 9
Position: [1x4 double]
Units: 'normalized'
```

Use GET to show all properties

