Contents


```
%-- 02/18/2020 02:37:00 PM --%
mkdir lab2
cd lab2
diary lab2_diary
```

```
Warning: Directory already exists.
```

Simboliskaa mateemaatika

Piemeers

```
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]
```

Simbolisko mainiigo defineesana

1. veids

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

```
ans =

x
```

pienemsim kaa x ir lielaaks 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 kaa a11 a12 a21 a22 ir relaali

```
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]
```

atvisinaasana

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

```
ans =

2*x
```

parciaalie atvisinaajumi

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

```
ans =

5*x^4


ans =

4*y^3
```

Integreesana

Nenoteiktais integraalis\

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

```
ans =

x^3/3


ans =

a*x^2
```

Noteiktais integraalis

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

```
ans =

18


ans =

    18
```

Robezas

limit()

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

```
ans =

-Inf


ans =

Inf
```

Vienaadojumu risinaashana

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

```
ans =

 2
 3
```

Vienaadojumu sisteemas

```
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: [1×1 sym]
    y: [1×1 sym]
    z: [1×1 sym]


ans =

5


ans =

6


ans =

10
```

izteiskmju vienkaarsosana

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

```
y =

((x - 1)*(x - 2))/((x - 3)*(x - 4)^2)
```

```
yd =

(x - 1)/((x - 3)*(x - 4)^2) + (x - 2)/((x - 3)*(x - 4)^2) - (2*(x - 1)*(x - 2))/((x - 3)*(x - 4)^3) - ((x - 1)*(x - 2))/((x - 3)^2*(x - 4)^2)


ans =

(- x^3 + 2*x^2 + 9*x - 16)/((x - 3)^2*(x - 4)^3)
```

izteiksju veinkaarsosana 2

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

```
y =

(x - 2)*(x - 3)


y2 =

x^2 - 5*x + 6
```

izteiksju veinkaarsosana 3

```
factor(y2)
```

```
ans =

[ x - 2, x - 3]
```

izteiksju veinkaarsosana 4

```
horner(y)
```

```
ans =

x*(x - 5) + 6
```

simboliskas konstantes

```
pi
format long
pi
a = vpa('pi')
b = vpa('2')
c = vpa(2)
a+b+c
digits(100)
a = vpa(pi)
a = vpa(exp(1))
sqrt(a)
digits(10)
sqrt(a)
class(a)
class(b)
class(c)
```

```
ans =

   3.141592653589793
```

```
ans =

   3.141592653589793


a =

3.141592654


b =

2.0


c =

2.0


ans =

7.141592654


a =

3.14159265358979323846264338327950288419716939937510582097494459230781640628620899862803482534211706 8


a =

2.71828182845904553488480814849026501178741455078125


ans =

1.64872127070012823768405335102145152436539608476930676568351985793954195541179771759821247072548530 3


ans =

1.648721271


ans =

    'sym'


ans =

    'sym'


ans =

    'sym'
```

izteismju "skaista" atteloshana

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

```
y =

((x - 1)*(x - 2))/((x - 3)*(x - 4)^2)

 (x - 1) (x - 2)
----------------
                2
(x - 3) (x - 4)
```

izteismju "skaista" atteloshana 2 variants

```
syms x
y = sqrt(x-1)/(x-4)^5
yltx = latex(y)
yltx2 = ['$',yltx,'$']
text(0,0.5,yltx2,'Interpreter','latex','FontSize',32,'BackgroundColor','white')
text(0.5,0.5,yltx2,'Interpreter','latex','FontSize',32,'BackgroundColor','white')
set(gca,'Visible','off')
```

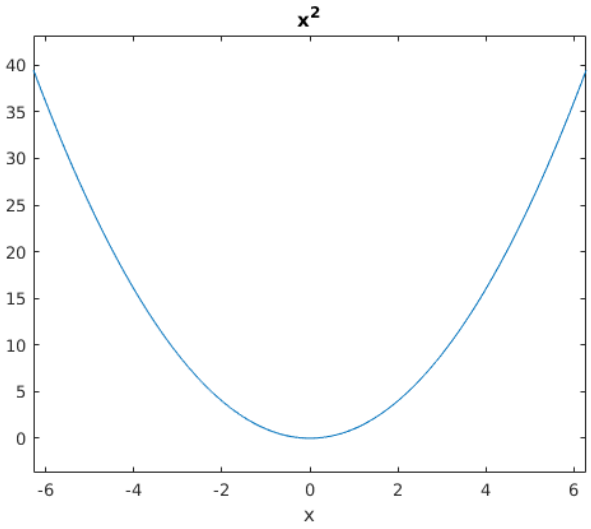
```
y =

(x - 1)^(1/2)/(x - 4)^5


yltx =

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


yltx2 =

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

$$\frac{\sqrt{x-1}}{(x-4)^5} \qquad \frac{\sqrt{x-1}}{(x-4)^5}$$

rezultaatu grafiska atteloshana

apreekinu veiksana

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



apreekinu veiksana

rezultaatu grafiskaa atteloshana ar plot

(2. lab. darba 2. uzdevums)

1.

Pienemsim ka ir dota funkcija, kurai ir jaatrod atvasinaajums Un gan funkciju, gan atvasinaajumu buus jaauziimee uz grafika izmantojot plot uzdotaajaa intervaalaa arii ar letex buus jaaizveido "legend" -a

```
syms x
y = x^3+2*x^2-5*x+4;
% 2.
yd = diff(y)
% atradam atvasinaajumu
% 3.
% Izteiksmes vektorizaacija
```

```
yd =

3*x^2 + 4*x - 5
```

(punktinu ielikshana)

```
yv = vectorize(y)
ydv = vectorize(yd)
```

```
yv =

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


ydv =

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

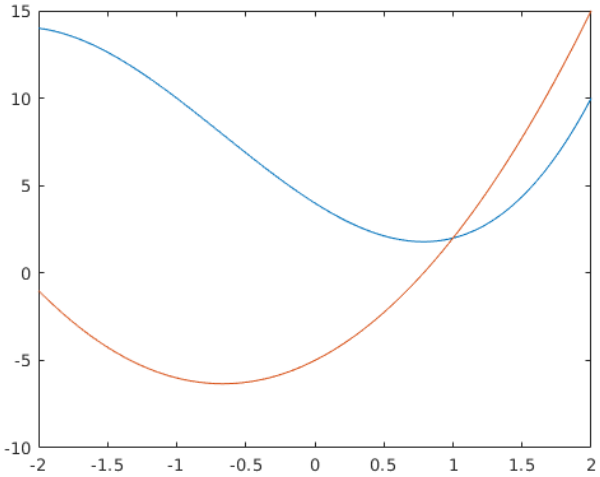
4. defineesim x kaa skaitlu vektoru

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

tas biija 5. solis, izteiksmes interpretaacjia, citiem vaardiem, paskataas kaads ir x un ieliek to

6. ziimesim ar plot

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

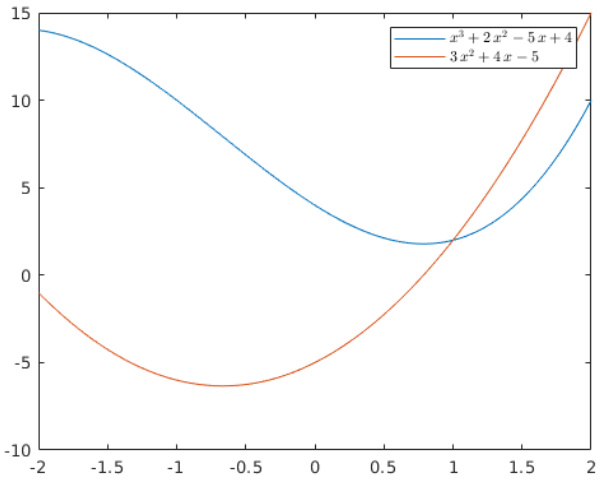


7. anoteesim grafiku

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

```
ydltxt =

    '3\,x^2+4\,x-5'


h =

Warning: Error updating Legend.

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

Warning: Error updating Legend.

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

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

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

  Use GET to show all properties


h =

Warning: Error updating Legend.

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

Warning: Error updating Legend.

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

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

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

Use GET to show all properties
```



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