1. **Нумерички прорачуни у симболичким изразима**

R = subs(S, {promenljiva1, promenljiva2, ...}, {broj1, broj2, ...})

>>syms x

>> s=12/5\*x^2+2\*exp(1/2\*x);

>> subs(s,x,2)

ans=

15.0366

>> sniz = subs(s,x,[2:0.5:4])

sniz=

15.0366 21.9807 30.5634 40.9092 53.1781

>> syms a g t v

>> y = v^2\*exp(a\*t)/g;

>> syms a b c e x

>> s = a\*x^e+b\*x+c;

>> subs(s, {a,b,c,e,x},{5,4,-20,2,3})

ans=

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>> syms a c m x y

>> s = a\*cos(m\*x)+c\*y;

>> a=10; m=0.5; c=3;

>> subs(s)

ans=

10\*cos(1/2\*x)+3\*y

>> x=linspace(0,2\*pi,4);

>> t=subs(s)

t=

[ 10+3\*y, 5+3\*y, -5+3\*y, -10+3\*y ]

**Simbolički izrazi se mogu konvertovati u druge tipove**

double(s), char(s), sym2poly(s), poly2sym(p)

>> syms x

>> sym2poly(x^4 - 3 + 5/2\*x^2)

ans =

1.0000 0 2.5000 0 -3.0000

>> poly2sym([1 0 0.6 -1 0.3], y)

ans =

y^4+3/5\*y^2-y+3/10

>> clear, syms x y

>> [b,i] = numden(x/y + y/x)

b =

x^2+y^2

i =

y\*x

>> syms z

>> G = ((z-1)\*(z+3))/((z+1)\*(z+2)^2);

>> [a b] = numden(G)

a =

(z-1)\*(z+3)

b =

(z+1)\*(z+2)^2

>> solve(a)

ans =

1

-3

>> solve(b)

ans =

-1

-2

-2

**Laplasova transformacija**

**L = laplace(F), F = ilaplace(L)**

>> clear, syms a b t

>> L = laplace(a\*t+b)

L =

a/s^2+b/s

>> F = ilaplace(L)

F =

a\*t+b

Neka je data prenosna funkcija sistema



i neka treba odrediti odziv sistema na pobudu 



>> clear, syms s t a

>> G = (s^2+a^2)/(s-a)^2/a;

>> u = sin(a\*t);

>> U = laplace(u,t,s)

U =

a/(s^2+a^2)

>> Y = G\*U

Y =

1/(s-a)^2

>> y = ilaplace(Y,s,t)

y =

t\*exp(a\*t)

**Z-transformacija**

ztrans(s), ztrans(s,k,w), iztrans(s), iztrans(s,w,k)



>> clear, syms n z

>> eq = sym('p(n+2) - p(n+1) - p(n)');

>> Zeq = ztrans(eq, n, z)

Zeq =

z^2\*ztrans(p(n),n,z)-p(0)\*z^2-p(1)\*z-z\*ztrans(p(n),n,z)+p(0)\*z-ztrans(p(n),n,z)

>> syms Pz

>> Zeq=subs(Zeq, {'ztrans(p(n),n,z)','p(0)','p(1)'}, {Pz,1,2})

Zeq =

z^2\*Pz-z^2-z-z\*Pz-Pz

>> P = solve(Zeq,Pz)

P =

z\*(z+1)/(z^2-z-1)

>> p = iztrans(P,z,n);

>> p = simple(p);

>> pretty(p)

>> god = 1:10;

>> pop = double(subs(p,n,god));

>> plot(god, pop,'rO')

>> title('Rast populacije zeceva');

>> xlabel('godine'); ylabel('p(n)'); grid on

**Primer 1:**

>> dsolve('D2y+4\*y=sin(2\*t)','y(0)=0','Dy(0)=0')

ans =

1/8\*sin(2\*t)-1/4\*cos(2\*t)\*t

>> yt=sym('y(t)')

yt =

y(t)

>> syms t

>> eq=diff(yt,2)+4\*yt-sin(2\*t)

eq =

diff(y(t),$(t,2))+4\*y(t)-sin(2\*t)

>> syms s

>> Seq=laplace(eq,t,s)

Seq =

s^2\*laplace(y(t),t,s)-D(y)(0)-s\*y(0)+4\*laplace(y(t),t,s)-2/(s^2+4)

>> syms Ys

>> Seq=subs(Seq,{'laplace(y(t),t,s)','D(y)(0)','y(0)'},{Ys,0,0})

Seq =

s^2\*Ys+4\*Ys-2/(s^2+4)

>> Ys=solve(Seq,Ys)

Ys =

2/(s^2+4)^2

>> y=ilaplace(Ys,s,t)

y =

1/8\*sin(2\*t)-1/4\*cos(2\*t)\*t

**Grafik – prikaz funckije odziva sistema**

>> fplot('1/8\*sin(2\*t)-1/4\*cos(2\*t)\*t',[-10 10 -10 10])

>> fplot(char(y),[-10 10 -10 10]) % bolji nacin