# ГРАФИЦИ

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| Ред. број | Команда | Резултат |
| primer1 | | |
| 1.1 | % iscrtavanje para x y  x=[2 3];  y=[4 5];  plot(x,y)  plot(x,y, 'r')  %Objasni help plot |  |
| 1.2 | plot(x,y,'Color',[.8 .7 0]) |  |
| 1.3 | plot(x,y,'LineWidth',4) |  |
| 1.4 | plot(x,y,'LineWidth',4,'Color',[.5 .2 0]) |  |
| primer2 | | |
|  | t=0:pi/100:2\*pi;  y=sin(t);  y2=sin(t-.25);  y3=sin(t-.5);  plot(t,y,t,y2,t,y3) |  |
| primer3 | | |
| 3.1 | y=exp(-x).\*cos(6\*pi\*x);  x=linspace(0,1,100);  plot(x,y) |  |
| 3.2 | w=exp(-x);  z=-w;  plot(x,y,'b-',x,w,'r:',x,z,'r:'),title('Treci dijagram') |  |
| 3.3 | text(.5,.9,'y=exp(-x).\*cos(6\*pi\*x)') |  |
| primer4 | | |
|  | % fplot – iscrtavanje funkcija  fplot('x^2+4\*sin(2\*x)-1',[-3,3,-5,5]) |  |
| primer5 | | |
| 5.1 | t=0:0.1:6\*pi;  x=sqrt(t).\*sin(2\*t);  y=sqrt(t).\*cos(2\*t);  z=0.5\*t;  plot3(x,y,z,'b','linewidth', 2) |  |
| 5.2 | % dodaj resetke  grid on; grid off |  |
| 5.3 | % dodaj nazive osa  xlabel('x'); ylabel('y'); zlabel('z'); |  |
| primer5` | | |
|  | %zadatak nacrtati grafik polinoma |  |
| primer6 | | |
|  | %aproksimacija polifit  x=[0.9 1.5 3 4 6 8 9.5];  y=[0.9 1.5 2.5 5.1 4.5 4.9 6.3];  p=polyfit(x,y,3)  xp=0.9:0.1:9.5;  yp= polyval(p,xp);  plot(x,y,'o',xp,yp);  xlabel('x');  ylabel('y'); |  |
| primer7 | | |
| 7.1 | %bar grafik  %vertikalni stepenasti grafikon  god=[2000:1:2006];  prodaja=[8 12 20 22 18 24 17];  bar(god,prodaja);  xlabel('Godina')  ylabel('Prodaja (u milionima)') |  |
| 7.2 | % dodaj za horizontalni trakasti grafikon  barh(god, prodaja) |  |
| 7.3 | % dodaj za vertikalni stepenasti grafikon  stairs(god, prodaja, 'r') |  |
| primer8 | | |
|  | % dodaj za grafikon diskretinih podataka  stem(god, prodaja) |  |
| primer9 | | |
|  | %kruzni dijagram  ocene=[11 18 26 9 5];  pie(ocene);  title('Ocene ucenika') |  |

# СИМБОЛИЧКА МАТЕМАТИКА

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| Ред. број | Команда | Резултат |
| Primer1  %simbolicki objekti, izrazi | | |
| 1.1 | bb=sym('bb') |  |
| 1.2 | c=sym(5)  e=5 |  |
| 1.3 | syms x y z | x  y  z |
| 1.4 | syms a b c x y  f=a\*x^2+b\*x+c  g=2\*a/3+4\*a/7-6.5\*x+x/3+4\*5/3 -1.5 | f = a\*x^2 + b\*x + c  g = (26\*a)/21 - (37\*x)/6 + 31/6 |
| Primer2  %findsym | | |
| 2.1 | syms x h w y d t  S=h\*x^2+d\*y^2+t\*w^2;  findsym(S) | ans =  d,h,t,w,x,y |
| 2.2 | findsym(S,5) | ans = x,y,w,t,h |
| 2.3 | findsym(S,1) | ans = x |
| Primer3  Promene oblika postojeceg simbolickog izraza  %collect %expand %factor %simplify %simple %pretty | | |
| 3.1 | syms x y  s=(x^2+x-exp(x))\*(x+3);  f=collect(s) | f = 4\*x^2 - x\*(exp(x) - 3) - 3\*exp(x) + x^3 |
| 3.2 | t=(2\*x^2+y^2)\*(x+y^2+3);  h=collect(t,y) | h = 2\*x^2\*(x + 3) + y^2\*(2\*x^2 + x + 3) + y^4 |
| 3.3 | syms a x y  s=(x+5)\*(x-a)\*(x+4);  t=expand(s) | t = 20\*x - 20\*a - 9\*a\*x - a\*x^2 + 9\*x^2 + x^3 |
| 3.4 | expand(sin(x-y)) | ans = cos(y)\*sin(x) - cos(x)\*sin(y) |
| 3.5 | syms x  s=x^3+4\*x^2-11\*x-30;  factor(s) | ans =  (x + 5)\*(x - 3)\*(x + 2) |
| 3.6 | syms x y  s=x\*(x\*(x-8)+10)-5;  SA=simplify(s) | SA =  x\*(x\*(x - 8) + 10) - 5 |
| 3.7 | t=(x+y)/(1/x+1/y);  simplify(t) | ans = x\*y |
| 3.8 | syms x  s=(x^3-4\*x^2+16\*x)/(x^3+64);  f=simple(s) | f =  x/(x + 4) |
| 3.9 | [g kako]=simple(s) | g = x/(x + 4)  kako = simplify |
| 3.10 | syms a b c x  s=sqrt(a\*x^2+b\*x+c);  pretty(s) | 2 1/2  (a x + b x + c) |
| Primer4  %Resavanje algebarskih jednacina | | |
| 4.1 | syms a b x y z  h=solve(exp(2\*z)-5) | h =  log(5)/2 |
| 4.2 | s=x^2-x-6  k=solve(s) | s = x^2 - x - 6  k =  -2  3 |
| 4.3 | solve('cos(2\*y)+3\*sin(y)=2') | ans =  pi/2  pi/6  (5\*pi)/6 |
| 4.4 | t=a\*x^2+5\*b\*x+20;  solve(t) | ans =  -(5\*b + 5^(1/2)\*(5\*b^2 - 16\*a)^(1/2))/(2\*a)  -(5\*b - 5^(1/2)\*(5\*b^2 - 16\*a)^(1/2))/(2\*a) |
| 4.5 | M=solve(t,a) | M = -(5\*b\*x + 20)/x^2 |
| Primer5  %resavanje sistema jednacina | | |
| 5.1 | syms x y t  s=10\*x+12\*y+16\*t;  [xt yt]=solve(s, '5\*x-y=13\*t') | xt = 2\*t  yt = (-3)\*t |
| 5.2 | AN= solve(s, '5\*x-y=13\*t')  %AN.x  %AN.y | AN =  x: [1x1 sym]  y: [1x1 sym] |
| Primer6  %Diferenciranje | | |
| 6.1 | syms x y t  s=exp(x^4);  diff(s) | ans =  4\*x^3\*exp(x^4) |
| 6.2 | r=5\*y^2\*cos(3\*t);  diff(r,t) | ans =  (-15)\*y^2\*sin(3\*t) |
| 6.3 | diff(s,2) | ans =  12\*x^2\*exp(x^4) + 16\*x^6\*exp(x^4) |
| Primer7  %Integraljenje | | |
| 7.1 | syms x y t  s=2\*cos(x)-6\*x;  int(s) | ans =    2\*sin(x) - 3\*x^2 |
| 7.2 | int(x\*sin(x)) | ans = sin(x) - x\*cos(x) |
| 7.3 | r=5\*y^2\*cos(4\*t);  int(r,y) | ans =  (5\*y^3\*cos(4\*t))/3 |
| 7.4 | int(sin(y)-5\*y^2,0,pi) | ans = 2 - (5\*pi^3)/3 |
| Primer8  %Resavanje obicne diferencijalne jednacine | | |
| 8.1 | dsolve('Dy=4\*t+2\*y') | ans =  C3\*exp(2\*t) - 2\*t - 1 |
| 8.2 | dsolve('D2x+2\*Dx+x=0') | ans = C5/exp(t) + (C6\*t)/exp(t) |
| 8.3 | dsolve('Ds=a\*x^2','x') | ans = (a\*x^3)/3 + C8 |
| 8.4 | dsolve('Ds=a\*x^2','a') | ans =  (a^2\*x^2)/2 + C10 |
| 8.5 | %Parcijalno resenje  dsolve('Dy+4\*y=60','y(0)=5') | ans =  15 - 10/exp(4\*t) |
| 8.6 | dsolve('D2y-2\*Dy+2\*y=0','y(0)=1','Dy(0)=0')  factor(ans) | ans = exp(t)\*cos(t) - exp(t)\*sin(t)  ans = exp(t)\*(cos(t) - sin(t)) |
| Primer9  %Numericki proracuni u simbolickim izrazima | | |
| 9.1 | syms x  s=12/5\*x^2+2\*exp(1/2\*x);  subs(s,x,2) | ans = 15.0366 |
| 9.2 | sniz=subs(s,x,[2:0.5:4]) | sniz = 15.0366 21.9807 30.5634 40.9092 53.1781 |
| 9.3 | syms a g t v  y=v^2\*exp(a\*t)/g;  subs(y,t,2)  yt=subs(y,t,[2:4]) | ans =  (v^2\*exp(2\*a))/g  yt =  [ (v^2\*exp(2\*a))/g, (v^2\*exp(3\*a))/g, (v^2\*exp(4\*a))/g] |
| 9.4 | 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 =  37 |
| 9.5 | syms a c m x y  s=a\*cos(m\*x)+c\*y;  a=10; m=0.5; c=3;  subs(s)  x=linspace(0,2\*pi,4);  t=subs(s) | ans = 3\*y + 10\*cos(x/2)  t = [ 3\*y + 10, 3\*y + 5, 3\*y - 5, 3\*y - 10] |
| Primer10  %Konvertovanje simbolickih izraza u druge tipove  %sym2poly(s) %poly2sym(s) %numden | | |
| 10.1 | syms x  sym2poly(x^4-3+5/2\*x^2) | ans = 1.0000 0 2.5000 0 -3.0000 |
| 10.2 | poly2sym([1 0 0.6 -1 0.3],y) | ans = y^4 + (3\*y^2)/5 - y + 3/10 |
| 10.3 | syms x y  [brojioc, imenioc]=numden(x/y+y/x) | brojioc = x^2 + y^2  imenioc = x\*y |
| 10.4 | s=solve('du\*v+u\*(dv+p(x)\*v)=q(x)','u') | s = (q(x) - du\*v)/(dv + v\*p(x)) |
| 10.5 | [brojioc, imenioc]=numden(s) | brojioc = q(x) - du\*v  imenioc =dv + v\*p(x) |
| 10.6 | syms z  G=((z-1)\*(z+3)/((z+1)\*(z+2)^2));  [brojioc, imenioc]=numden(G) | brojioc =(z - 1)\*(z + 3)  imenioc =(z + 1)\*(z + 2)^2 |

# ТРАНСФОРМАЦИЈЕ

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| Ред. број | Команда | Резултат |
| Лапласова трансформација | | |
| 1.1 | syms a b t  L = laplace(a\*t+b)  F = ilaplace(L) | L = a/s^2 + b/s  F = b + a\*t |
| 1.2 | %Jedna od primeni Laplasove i inverzne laplasove transformacije je za određivanje odziva 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/(a^2 + s^2) |
| Z трансформација | | |
| 2.1 | %'problem zečeva'  clear, syms n z  eq = sym('p(n+2) - p(n+1) - p(n)');  Zeq = ztrans(eq, n, z) | Zeq = z\*p(0) - z\*ztrans(p(n), n, z) - z\*p(1) + z^2\*ztrans(p(n), n, z) - z^2\*p(0) - ztrans(p(n), n, z) |
|  | syms Pz  Zeq=subs(Zeq, {'ztrans(p(n),n,z)','p(0)','p(1)'}, {Pz,1,2}) | Zeq = Pz\*z^2 - z - Pz\*z - Pz - z^2 |
|  | P = solve(Zeq,Pz) | P = -(z^2 + z)/(z - z^2 + 1) |
|  | p = iztrans(P,z,n);  p = simple(p);  pretty(p) | *Резултат испод* |
| / 1/2 \n - 1 / 1/2 \n - 1  1/2 | 5 | 1/2 | 5 | n / / PI \ \  3 5 | 1/2 - ---- | 3 5 | ---- + 1/2 | 4 (-1) cos| n | -- + arcsinh(1/2) I | |  \ 2 / \ 2 / \ \ 2 / /  -------------------------- - -------------------------- + ----------------------------------------  5 5 n  I | | |
| 2.2 | %Zakonitost po kojoj se menja velicina populacije zeceva- graficki:  god = 1:10;  pop = double(subs(p,n,god));  plot(god, pop,'rO')  title('Rast populacije zeceva');  xlabel('godine'); ylabel('p(n)'); grid on |  |

# ПРИПРЕМНИ ЗАДАТАК

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| Ред. број | Команда | Резултат |
| Sistem je opisan diferencijalnom jednačinom | | |
| А) | Naći rešenje diferencijalne jednačine na klasičan način  >>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 |
| Б) | Naći rešenje diferencijalne jednačine pomoću Laplas i inverzne Laplas transformacije  >> syms y t  >>Seq=laplace(diff(sym('y(t)'),2)+4\*sym('y(t)')-sin(2\*t)) | 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)','y(0)','D(y)(0)'},{Ys,0,0,0}) | Seq =  s^2\*Ys+4\*Ys-2/(s^2+4) |
|  | >> Y = solve(Seq, Ys) | Y = 2/(s^2+4)^2 |
|  | >> y = ilaplace(Y) | y = 1/8\*sin(2\*t)-1/4\*t\*cos(2\*t) |
| В) | Grafički prikazati rešenje diferencijalne jednačine |  |