Neke osnovne funkcije iz MatLab-a za rješavanje zadataka iz Analize 3 (primjeri, 2. dio)

Crtanje trodimenzionalnih površi

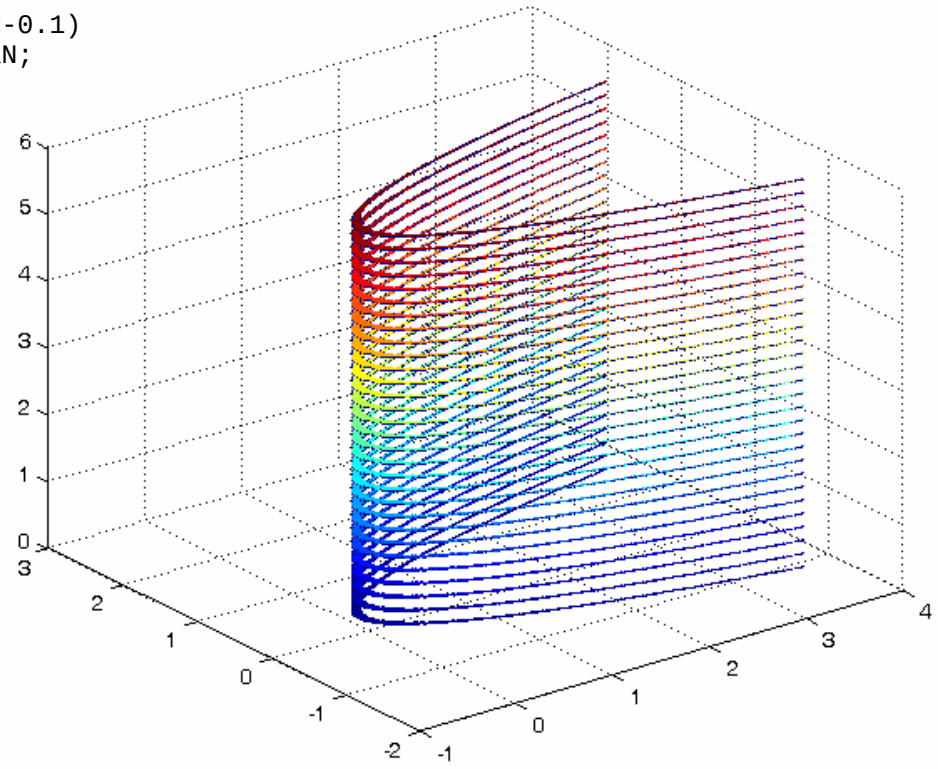
Primjer 1.

U xyz ravni nacrtati površ $x = 2y^2$ (cilindar).

Rješenje:

cilindar.m

```
[x,y]=meshgrid(-1:0.01:3.5,-2:0.01:3);
z1=x;
z2=x;
[visina,sirina]=size(z1);

for k=1:1:30
for i=1:1:visina
    for j=1:1:sirina
        z1(i,j)=(x(i,j)-2*y(i,j)^2);
        if z1(i,j)>=0
            z1(i,j)=NaN;
        end
        if ( z1(i,j)<0 && z1(i,j)>=-0.1 )
           z1(i,j)=(0.2)*k;
        end
        if ( z1(i,j)<-0.1)
           z1(i,j)=NaN;
        end
    end
end



figure(3);
mesh(x,y,z1)
hold on;
end
```



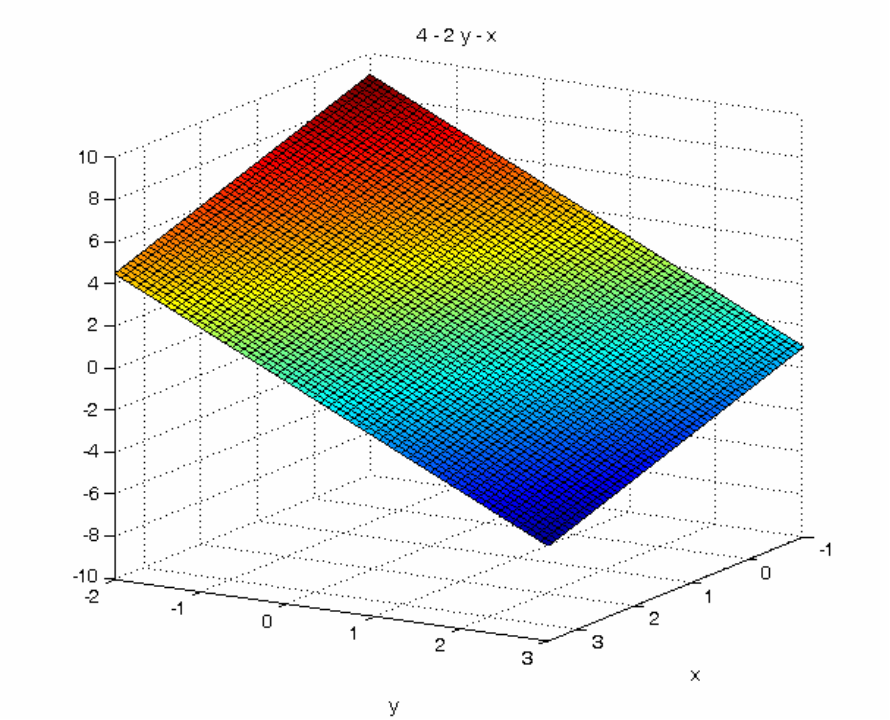
Primjer 2.

U xyz ravni nacrtati ravan $x+2y+z=4$.

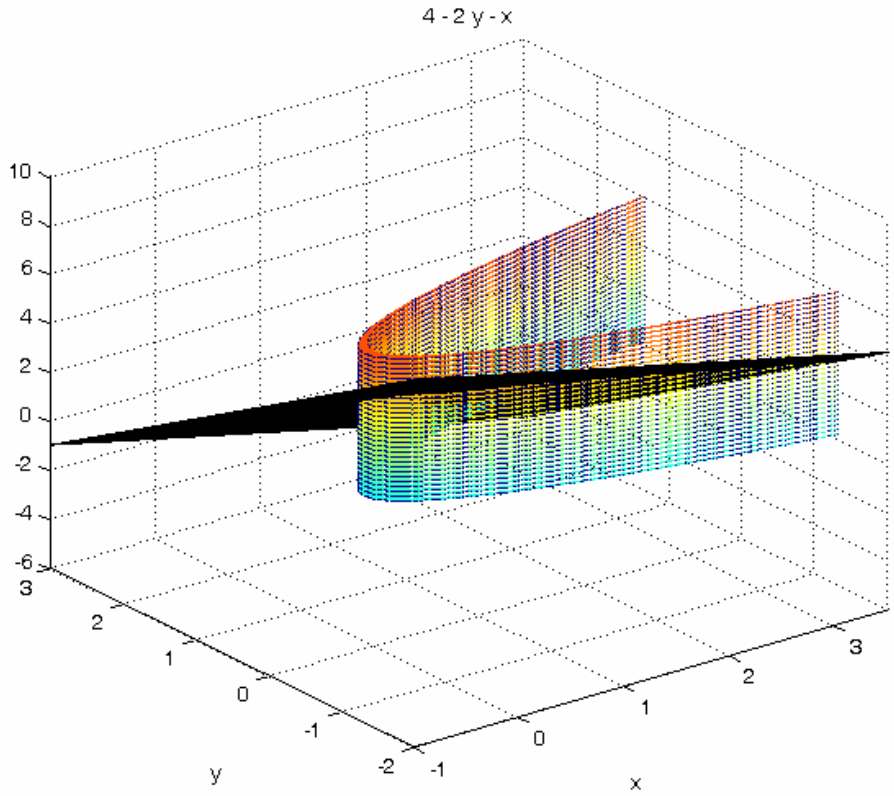
Rješenje:

ravan.m

```
syms x y
z=4-x-2*y;
figure(2);
ezsurf(z,[-3 3]);
```



Presjek ravni $x+2y+z=4$ i cilindra $x=2y^2$:



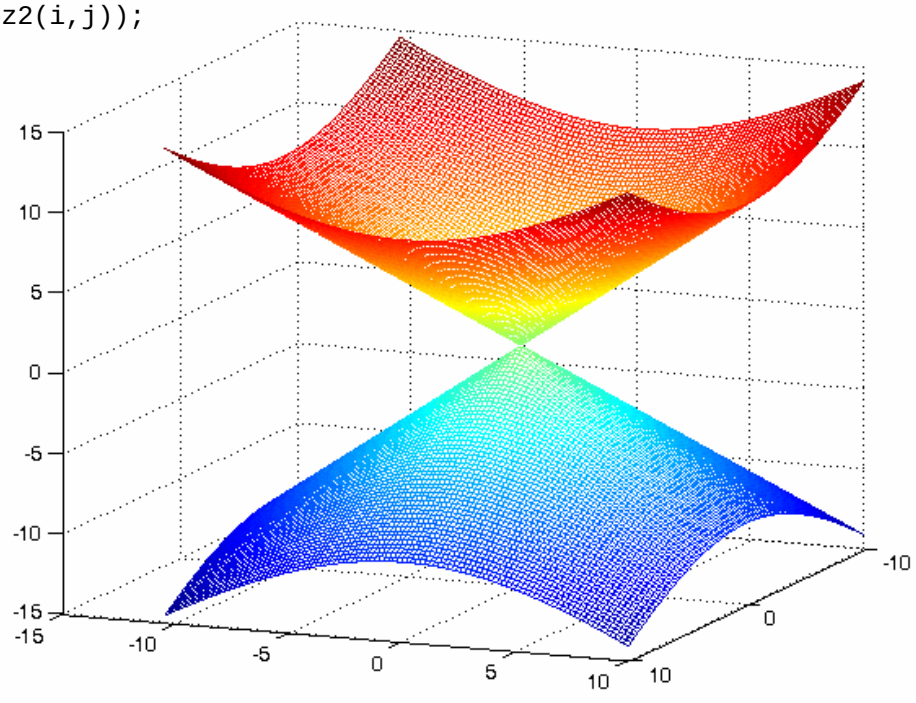
Primjer 3.

Nacrtati tijelo $x^2 + y^2 = z^2$ (čunj).

Rješenje:

cunj.m

```
[x,y]=meshgrid(-10:0.2:10,-10.5:0.2:10);
z1=x;
z2=x;
[visina,sirina]=size(z1);

for i=1:1:visina
    for j=1:1:sirina
        z1(i,j)=(x(i,j)^2+y(i,j)^2);
        if z1(i,j)<-0.5
            z1(i,j)=NaN;
        end
        if ( z1(i,j)>-0.5 && z1(i,j)<0 )
           z1(i,j)=0;
        end
        if ( z1(i,j)>=0)
           z1(i,j)=-sqrt(z1(i,j));
        end
    end
end

for i=1:1:visina
    for j=1:1:sirina
        z2(i,j)=(x(i,j)^2+y(i,j)^2);
        if z2(i,j)<-0.5
            z2(i,j)=NaN;
        end
        if ( z2(i,j)>-0.5 && z2(i,j)<0 )
           z2(i,j)=0;
        end
        if ( z2(i,j)>=0)
           z2(i,j)=sqrt(z2(i,j));
        end
    end
end

figure(3);
mesh(x,y,z1)
hold on;
mesh(x,y,z2)
```



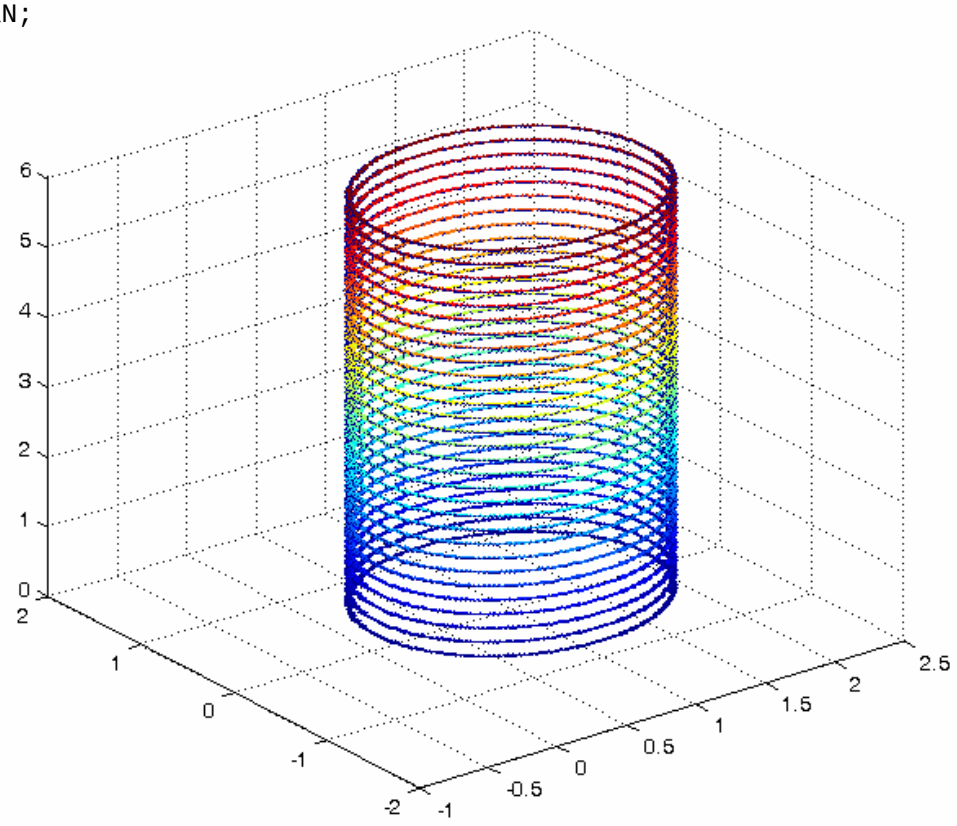
Primjer 4.

Nacrtati tijelo $x^2 + y^2 = 2x$ (valjak).

Rješenje:

valjak.m

```
[x,y]=meshgrid(-1:0.02:2.5,-2:0.02:2);
z1=x;
z2=x;
[visina,sirina]=size(z1);


for k=1:1:30
for i=1:1:visina
    for j=1:1:sirina
        z1(i,j)=(x(i,j)^2+y(i,j)^2-2*x(i,j));
        if z1(i,j)>=0
            z1(i,j)=NaN;
        end
        if ( z1(i,j)<0 && z1(i,j)>=-0.1 )
           z1(i,j)=0.2*k;
        end
        if ( z1(i,j)<-0.1)
           z1(i,j)=NaN;
        end
    end
end



figure(3);
mesh(x,y,z1)
hold on;
end
```



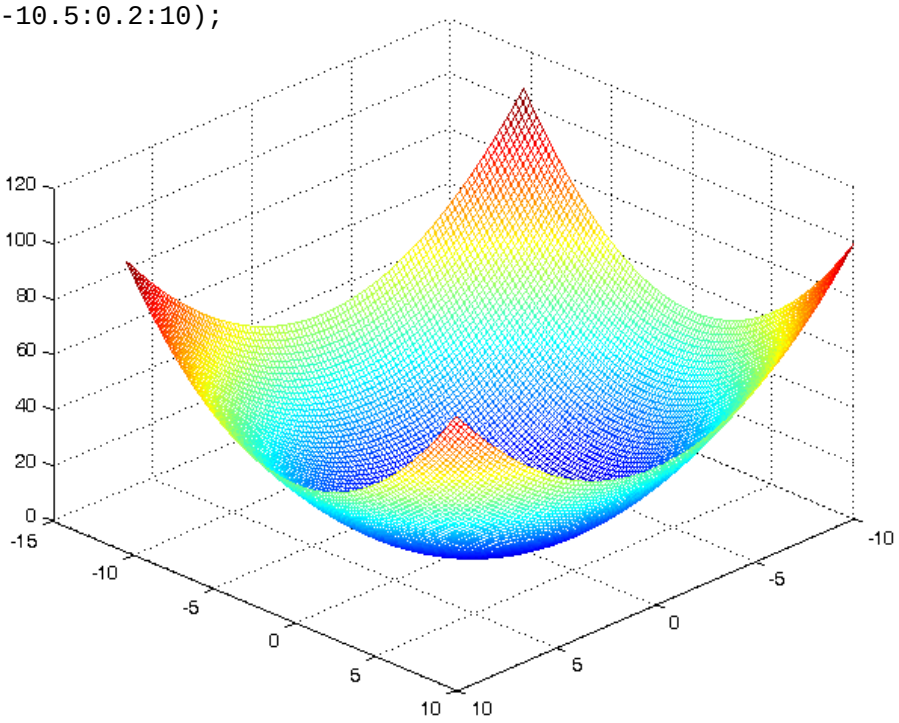
Primjer 5.

Nacrtati tijelo $2z = x^2 + y^2$ (paraboloid).

Rješenje:

paraboloid.m

```
[x,y]=meshgrid(-10:0.2:10,-10.5:0.2:10);
z=x;
[visina,sirina]=size(z1);

z=(1/2)*(x.^2+y.^2);

figure(4);
mesh(x,y,z)
hold on;
```



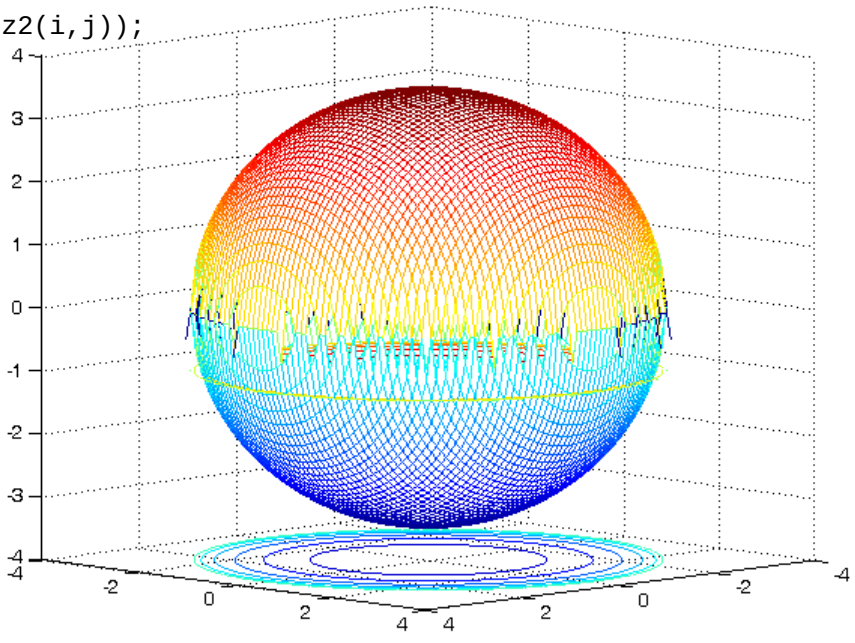
Primjer 6.

Nacrtati tijelo $x^2 + y^2 + z^2 = 12$ (kugla).

Rješenje:

kugla.m

```
[x,y]=meshgrid(-4:0.1:4,-4:0.1:4);
z1=x;
z2=x;
[visina,sirina]=size(x);

for i=1:1:visina
    for j=1:1:sirina
        z1(i,j)=(12-x(i,j)^2-y(i,j)^2);
        if z1(i,j)<-0.5
            z1(i,j)=NaN;
        end
        if ( z1(i,j)>-0.5 && z1(i,j)<0 )
           z1(i,j)=0;
        end
        if ( z1(i,j)>=0)
           z1(i,j)=sqrt(z1(i,j));
        end
    end
end


for i=1:1:visina
    for j=1:1:sirina
        z2(i,j)=(12-x(i,j)^2-y(i,j)^2);
        if z2(i,j)<-0.5
            z2(i,j)=NaN;
        end
        if ( z2(i,j)>-0.5 && z2(i,j)<0 )
           z2(i,j)=0;
        end
        if ( z1(i,j)>=0)
           z2(i,j)=-sqrt(z2(i,j));
        end
    end
end

figure(1);
surf(x,y,z1)

figure(2);
surfl(x,y,z2)


figure(4);
meshc(x,y,z1)
hold on;
meshc(x,y,z2)
```



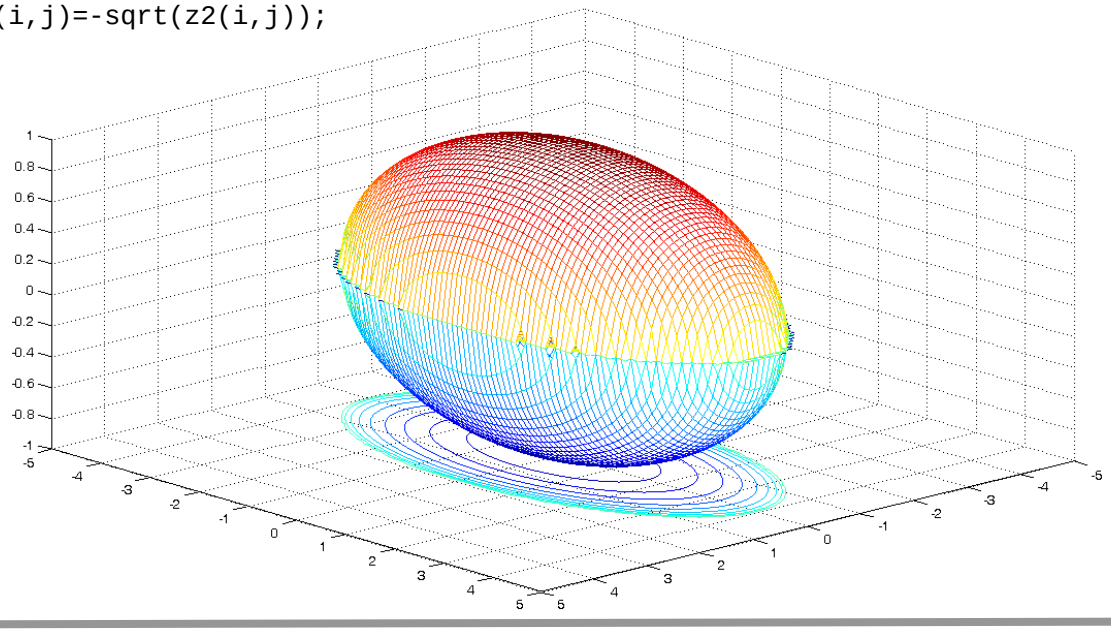
Primjer 7.

Nacrtati tijelo $\frac{x^2}{4}+\frac{y^2}{16}+\frac{z^2}{9}=1$ (elipsoid).

Rješenje:

elipsoid.m

```
[x,y]=meshgrid(-5:0.1:5,-5:0.1:5);
z1=x;
z2=x;
[visina,sirina]=size(x);

for i=1:1:visina
    for j=1:1:sirina
        z1(i,j)=(1-(1/4)*x(i,j)^2-(1/16)*y(i,j)^2);
        if z1(i,j)<-0.1
            z1(i,j)=NaN;
        end
        if ( z1(i,j)>-0.1 && z1(i,j)<0 )
           z1(i,j)=0;
        end
        if ( z1(i,j)>=0)
           z1(i,j)=sqrt(z1(i,j));
        end
    end
end


for i=1:1:visina
    for j=1:1:sirina
        z2(i,j)=(1-(1/4)*x(i,j)^2-(1/16)*y(i,j)^2);
        if z2(i,j)<-0.1
            z2(i,j)=NaN;
        end
        if ( z2(i,j)>-0.1 && z2(i,j)<0 )
           z2(i,j)=0;
        end
        if ( z1(i,j)>=0)
           z2(i,j)=-sqrt(z2(i,j));
        end
    end
end

figure(4);
meshc(x,y,z1)
hold on;
meshc(x,y,z2)
```



Primjer 8.

Nacrtati tijelo $x^2 + y^2 - z^2 = -9$ (hiperboloid).

Rješenje:

hiperboloid.m

```
[x,y]=meshgrid(-5:0.1:5,-5:0.1:5);
z1=x;
z2=x;
[visina,sirina]=size(x);

for i=1:1:visina
    for j=1:1:sirina
        z1(i,j)=sqrt((x(i,j)^2+y(i,j)^2+9));
    end
end


for i=1:1:visina
    for j=1:1:sirina
        z2(i,j)=-sqrt((x(i,j)^2+y(i,j)^2+9));
    end
end

figure(4);
meshc(x,y,z1)
hold on;
meshc(x,y,z2)
```