```
%%%%%%%%%%%%%%%%%%%%%%%%%%%
% grafica funciones de dos variables. usa surf y surfc
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
clc, clear
x=-10:.4:10;
y=-10:.4:10;
n=length(x);
m=length(y);
[X,Y] = meshgrid(x,y);
Z = Y./(X.^2+Y.^2+1);
Z1=(X.^2+Y.^2);

figure
surf(X,Y,Z)
figure
surfc(Z)              %surfc hace el mismo grafico con curvas de nivel
figure
surf(X,Y,Z1)
```

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% curvas de nivel. uso contour y [C,h] para manejar detalles
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

clc, clear
x=-2:.01:4;
y=-3:.01:3;
[X,Y]=meshgrid(x,y);
Z=(X.^3+Y.^2)./(X.^2+Y.^2);
Q=27/32*(X.^2.*(X-2)-Y.^2);
%surf(X,Y,Z)
%surf(X,Y,Q)
figure
contour(X,Y,Z,20)     %hace las curvas de nivel; pido 20 curvas
grid on

figure
[C,h]=contour(X,Y,Q,[-10,-5,-3,-2,-.2,-1,2,7,15]); %elijo niveles
axis square
%clabel(C,h,'manual','FontSize',12)
clabel(C,h,'FontSize',12)   %pone números en curvas
grid on
```

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%  Generamos graficos de superficies parametricas
%%%  usando el comando EZSURF que acepta expresiones
%%%  el vector que sigue las expresiones indica el dominio
%%%  de los parametros; los toma en orden alfabetico
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
clc, clear
figure(1)
ezsurf('(2+sin(v))*cos(u)','(2+sin(v))*sin(u)','u+cos(v)',[0,4*pi,0,2*pi]
,30)
view([2.5,2,1.5])
axis equal
figure(2)
ezsurf('(7+2*cos(v))*cos(u)','(7+2*cos(v))*sin(u)','2*sin(v)',[0,2*pi,0,2
*pi])
view([2.5,2,1.5])
axis equal
%title 'toroide'
figure(3)
ezsurf('(u*cos(v))','(u*sin(v))','v',[0,2*pi,pi,4*pi],30)
view([2.5,2,1.5])
%title 'Helicoide'
axis equal
figure(4)
ezsurf('x','(sin(x)*cos(v))','(sin(x)*sin(v))',[0,2*pi,0,2*pi])
view([2,3,1.5])
axis equal
%title 'sup. de revolución'
figure(5)
ezsurf('u^2','v^2','u+2*v',[-5,5,-5,5])
view([2.5,2,1.5])
axis equal
figure(6)
ezsurf('u^2','v^2','u+2*v',[-5,5,-5,5])  %el mismo que el 5 desde otro
punto de vista
%view([2.5,2,1.5])
axis equal
```

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%  DIBUJO UN CAMPO VECTORIAL GRADIENTE DE UNA f
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
clc, clear
[X,Y] = meshgrid(-2:pi/30:2);
q=1;ep=1;x0=1;
k=q/(4*pi*ep);
Z=-k*((((X-x0).^2+Y.^2).^(-.5))+(((X+x0).^2+Y.^2).^(-.5)));
[DX,DY] = gradient(Z,.2,.2);
contour(X,Y,Z)
hold on
quiver(X,Y,DX,DY,2)
colormap hsv
hold off
```

```
%%%%%%%%%%%%%%
% CAMPO VECTORIAL NORMAL A SUPERFICIE
%%%%%%%%%%%%%%%%%%
clc, clear
[X,Y] = meshgrid(-2:0.25:2,-1:0.2:1);
Z = X.* exp(-X.^2 - Y.^2);   %ESTA ES LA FUNCION CUYO GRÁFICO ES LA SUP
[U,V,W] = surfnorm(X,Y,Z);   %ESTE ES EL CAMPO VECTORIAL NORMAL A LA SUP
quiver3(X,Y,Z,U,V,W,0.5);    %ACÁ GRAFICAMOS EL CAMPO VECTORIAL
hold on
surf(X,Y,Z);
colormap hsv
view(-35,45)
axis ([-2 2 -1 1 -.6 .6])
hold off
```

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% campo vectorial whirlpool usando quiver
% el gráfico PARECE PLANO pero no lo es. hay que moverlo
% usando Rotate3d para que se vea desde otros
% puntos de vista.
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

clc, clear
[X,Y,Z] = meshgrid(-3:1:3,-3:1:3,-3:3:3);
n=size(X);
% el campo que grafico es F(X,Y,Z)=(-Y/(X^2+Y^2),X/(X^2+Y^2),0)
hold on
d=size(Z);
W=zeros(d);
quiver3(X,Y,Z,-Y./(X.^2+Y.^2),X./(X.^2+Y.^2),W,1,'Color',[.5 .5 .5])
axis equal
colormap hsv
hold off
```

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% serie de Fourie. funcion generadora:
%        f(x)= 0 entre -pi y 0   y    f(x)=-x+pi   entre 0 y pi
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
clc, clear
x=-10:.1:10;                %valores de x para la serie de Fourier
d=length(x);
x0=-pi:.1:pi;               %valores de x para la función generadora de
la serie
d0=length(x0);
z=zeros(1,d0);               %defino el vector z con la verdadera función
for i=1:d0
    if x0(i)>0
        z(i)=-x0(i)+pi;      %función generadora de la serie
    end
end
y0=pi/4*ones(1,d);          %armo el vector y que es una suma parcial de
la serie; y0=a0/2
s=zeros(1,d);
for n=1:300
    s=s+(1-(-1)^n)/(n^2*pi)*cos(n*x)+sin(n*x)/n;  %suma parcial de la
serie sin a0/2
    y=y0+s;                  %suma parcial de la serie con a0/2
    if n==3
        y3=y;
    end
    if n==7
        y7=y;
    end
    if n==15
        y15=y;
    end
    plot(x,y,'LineWidth',3)   %grafica la suma parcial de la serie
    hold on
    plot(x0,z,'r','LineWidth',3)  %grafica la función generadora de la
serie
    hold off
    xlim([-10 10])
    ylim([-1 4])
    title(num2str(n))      %pone el número de suma parcial
    %axis 'equal'
    grid on
    drawnow              %esta es la orden que hace que vaya dibujando
cada vez que la lee
end                      %gracias a ella, se ve animado.
figure (2)
plot(x,y3,'g','LineWidth',2)
hold on
%plot(x0,z,'r','LineWidth',3)
xlim([-10 10])
ylim([-1 4])
title('n=3 y 15')
%axis 'equal'
grid on
plot(x,y,'b','LineWidth',2)
plot(x,y15,'Color',[.8 .2 .5],'LineWidth',2)
```