Graficas 2D y 3D

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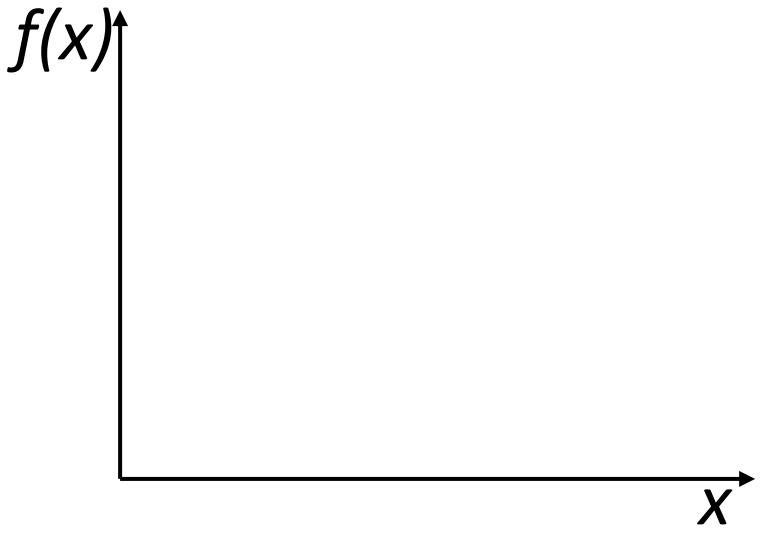
¿Cómo grafica Scilab en 2D?

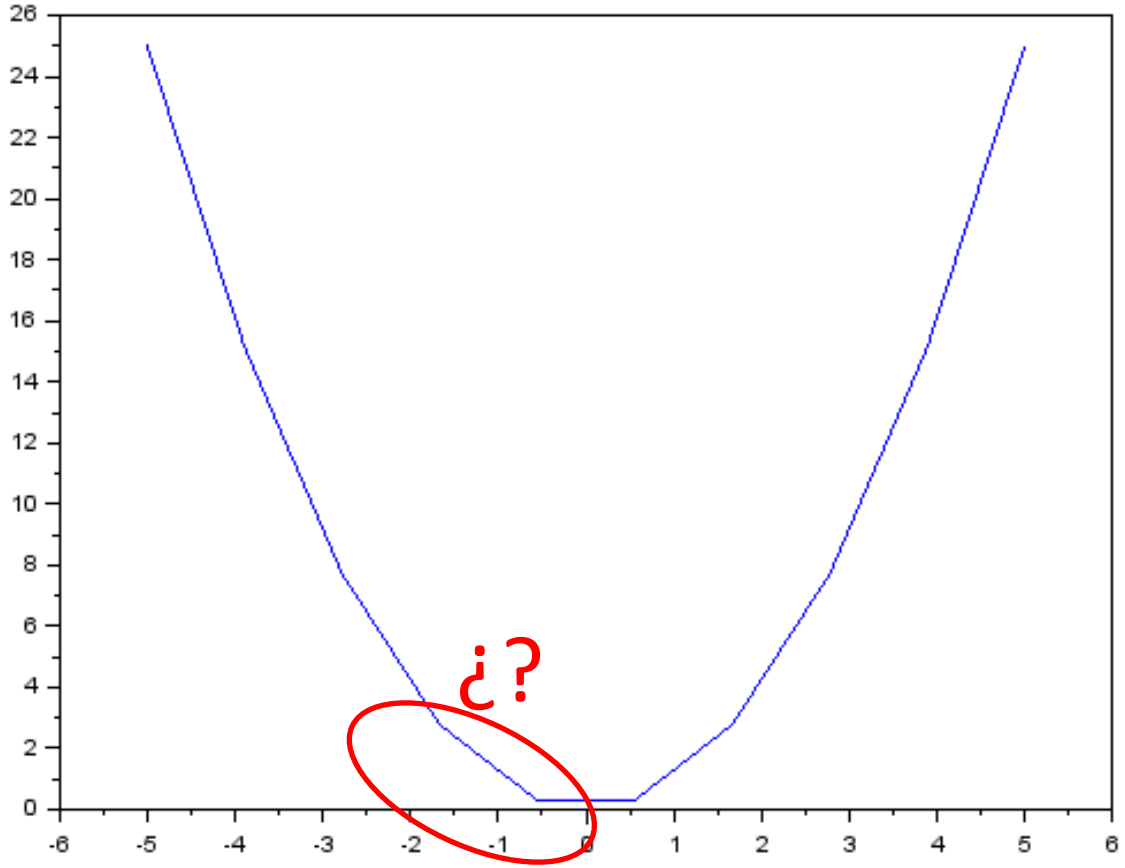
Scilab solamente grafica pares de puntos que luego se unen o no según se prefiera.

x	$f(x)$
x_1	$f(x_1)$
x_2	$f(x_2)$
x_3	$f(x_3)$
$\vdots$	$\vdots$
x_n	$f(x_n)$



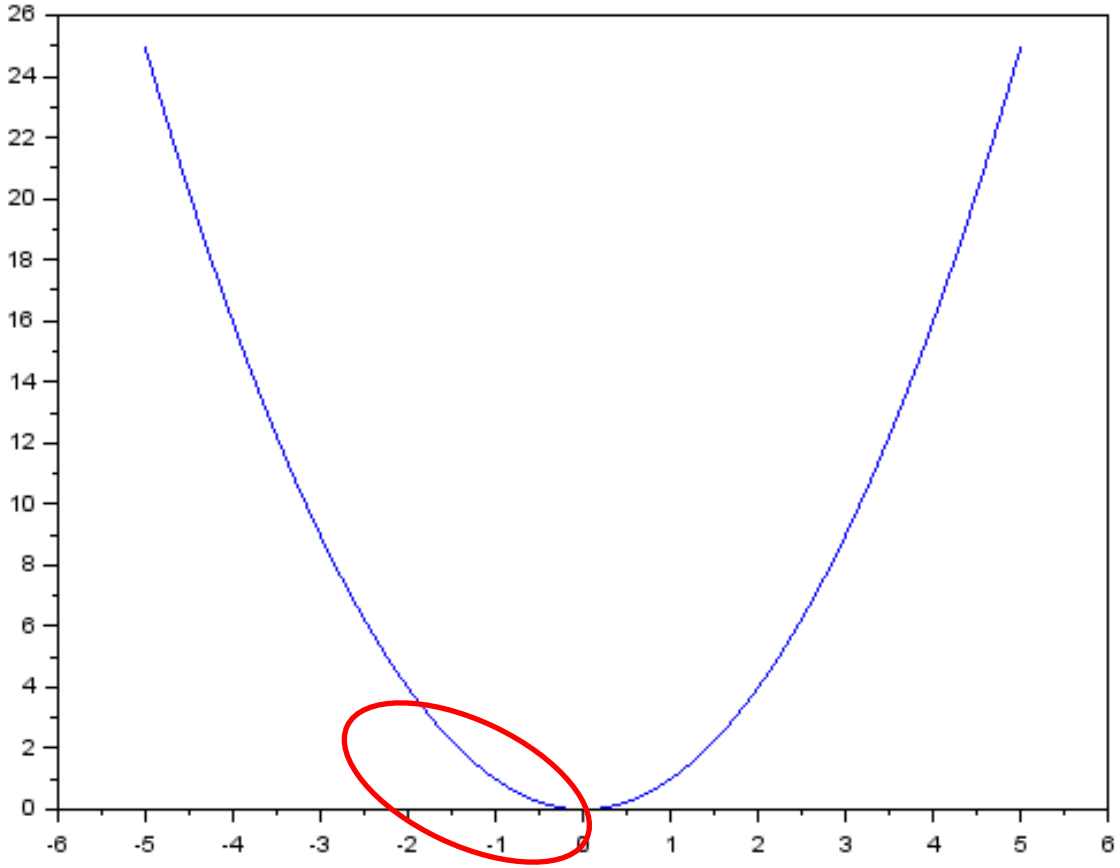
Ejemplo: $f(x) = x^2$

```
x=linspace(-5,5,10);
y=x.^2;
plot(x,y)
```



Ejemplo: $f(x) = x^2$

```
x=linspace(-5,5,100);
y=x.^2;
plot(x,y)
```



Gráficas 3D

¿Cómo grafica Scilab en 3D?

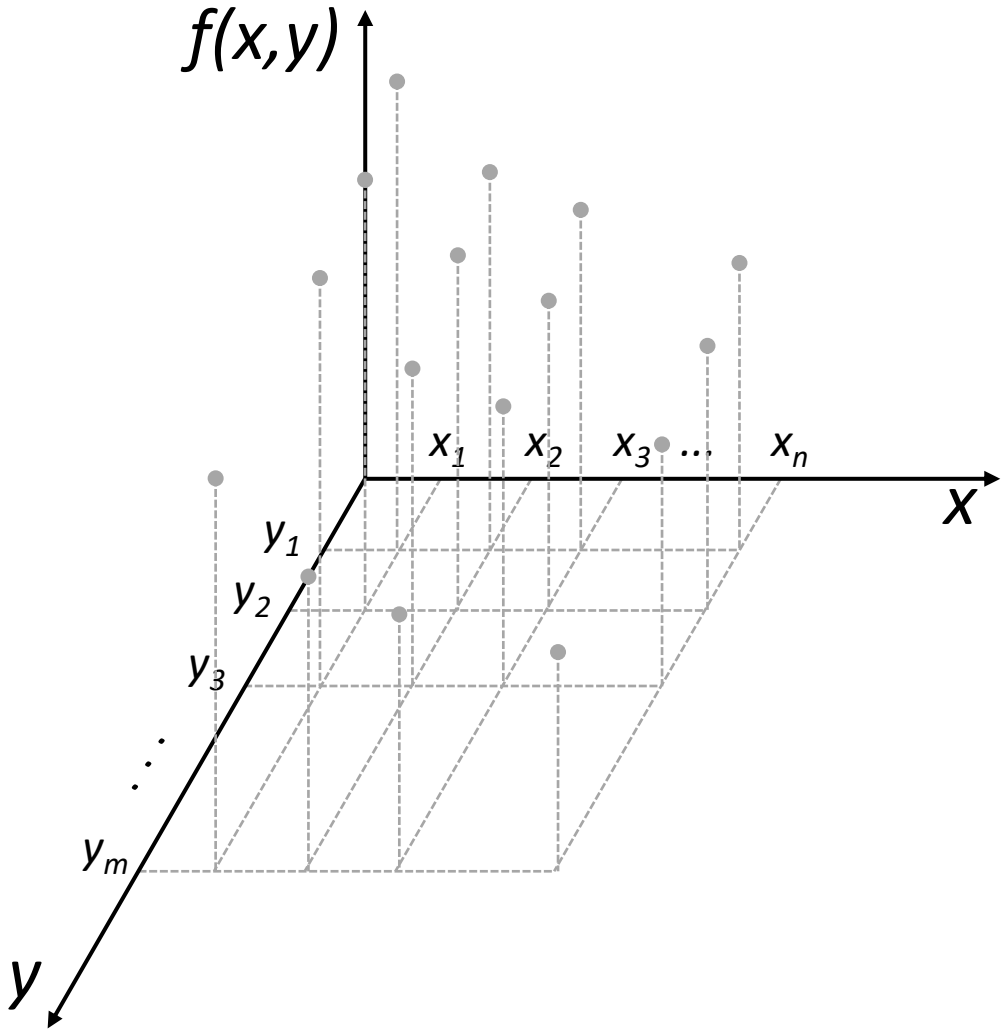
El dominio se define a partir de dos vectores y la función es evaluada combinando todos los elementos de ambos vectores.

x	y
x_1	y_1
x_2	y_2
x_3	y_3
$\vdots$	$\vdots$
x_n	y_m

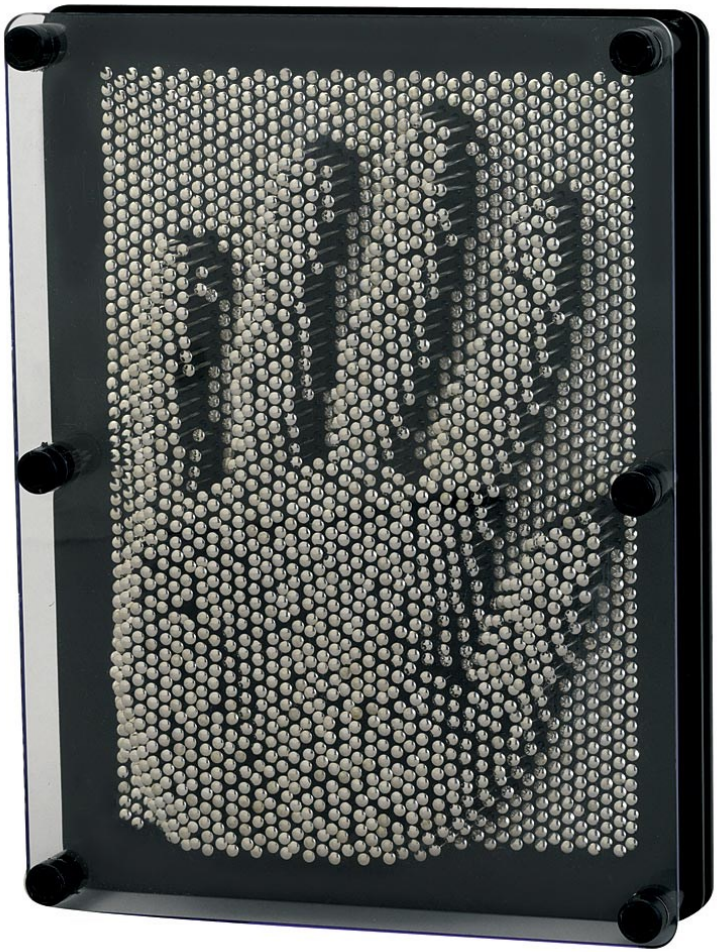
$f(x,y)$

$f(x_1,y_1)$	$f(x_2,y_1)$	$\cdots$	$f(x_n,y_1)$
$f(x_1,y_2)$	$f(x_2,y_2)$	$\cdots$	$f(x_n,y_2)$
$f(x_1,y_3)$	$f(x_2,y_3)$	$\cdots$	$f(x_n,y_3)$
$\vdots$	$\vdots$	$\cdots$	$\vdots$
$f(x_1,y_m)$	$f(x_2,y_m)$	$\cdots$	$f(x_n,y_m)$

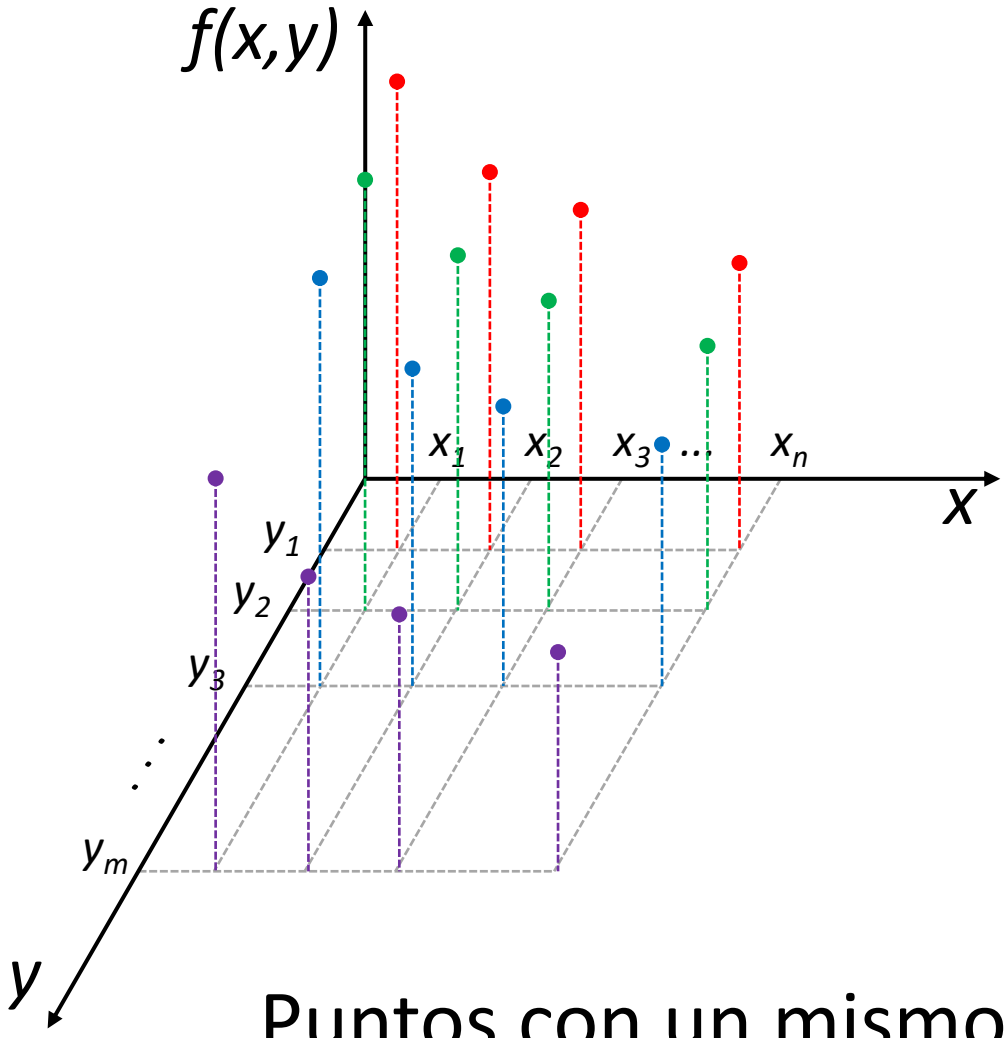
Gráficas 3D



¿Parecido?

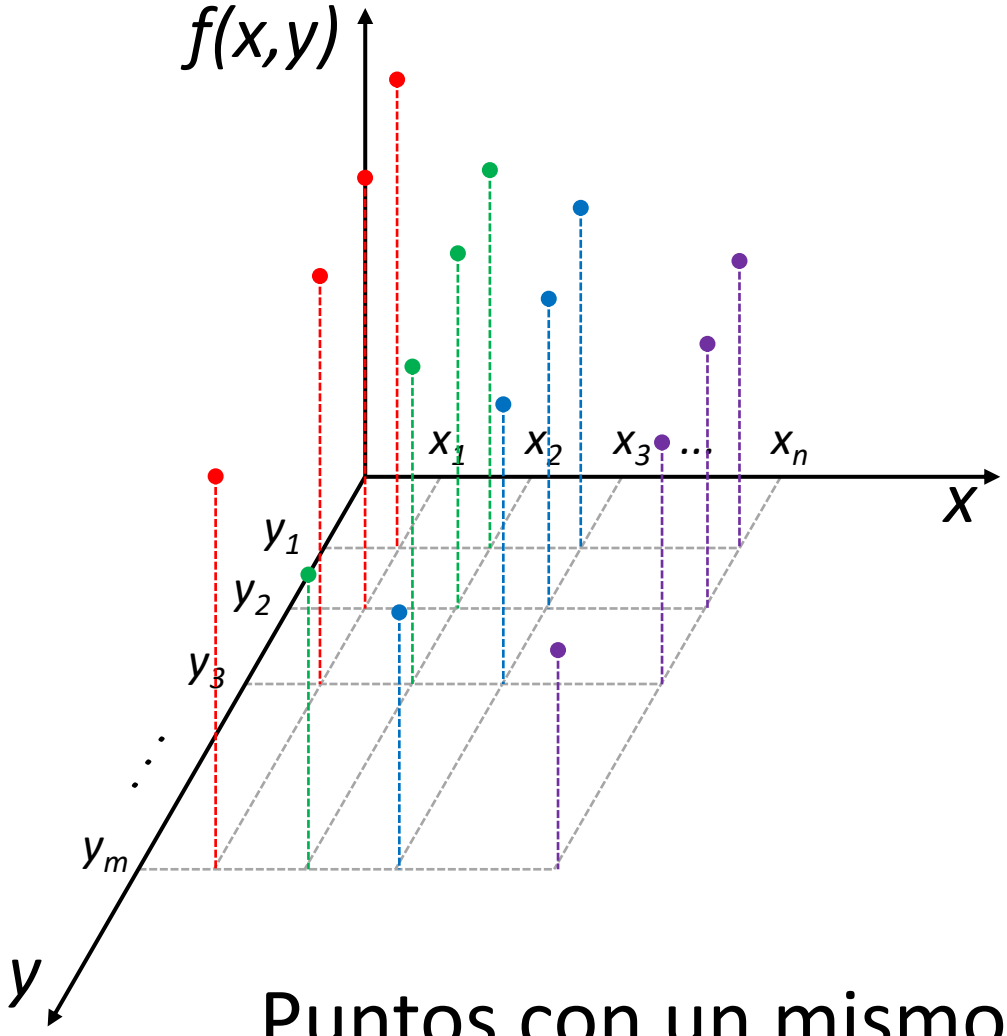


Gráficas 3D



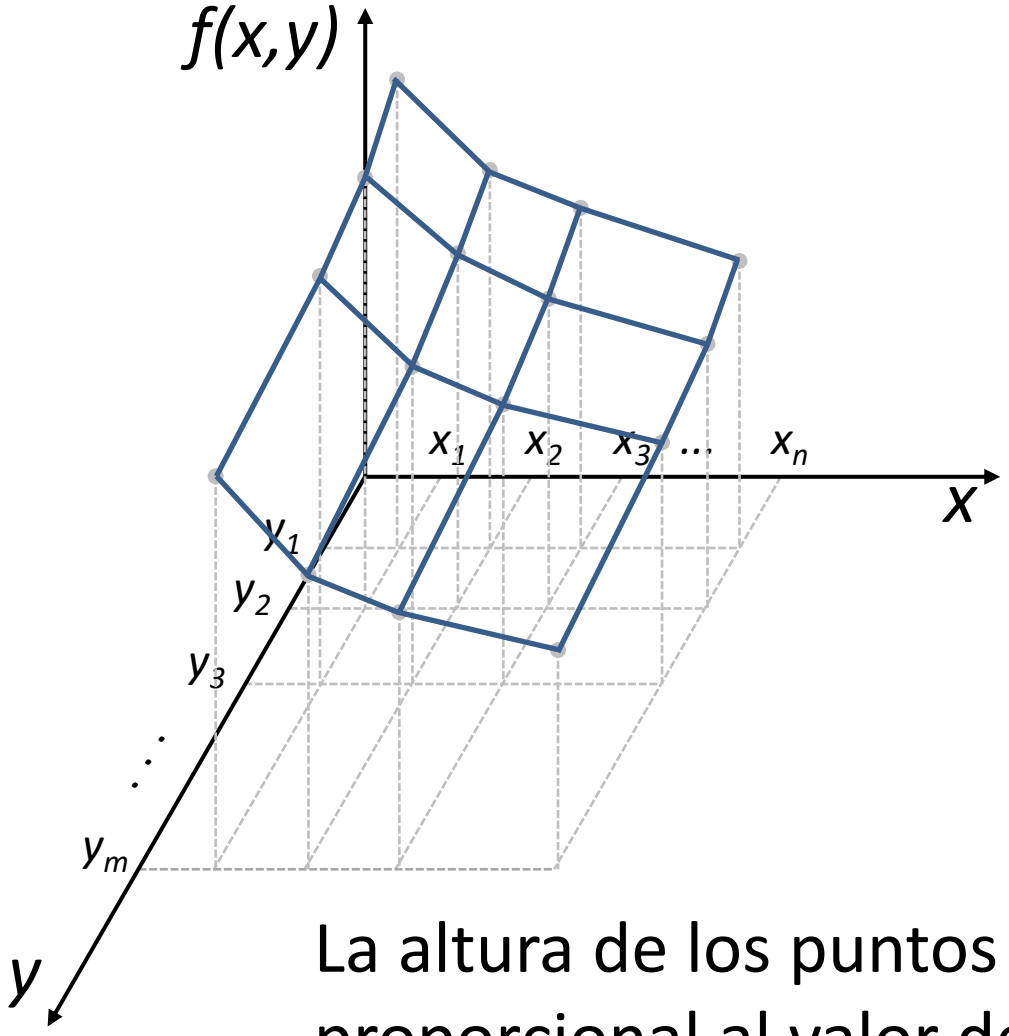
Puntos con un mismo valor de y

Gráficas 3D



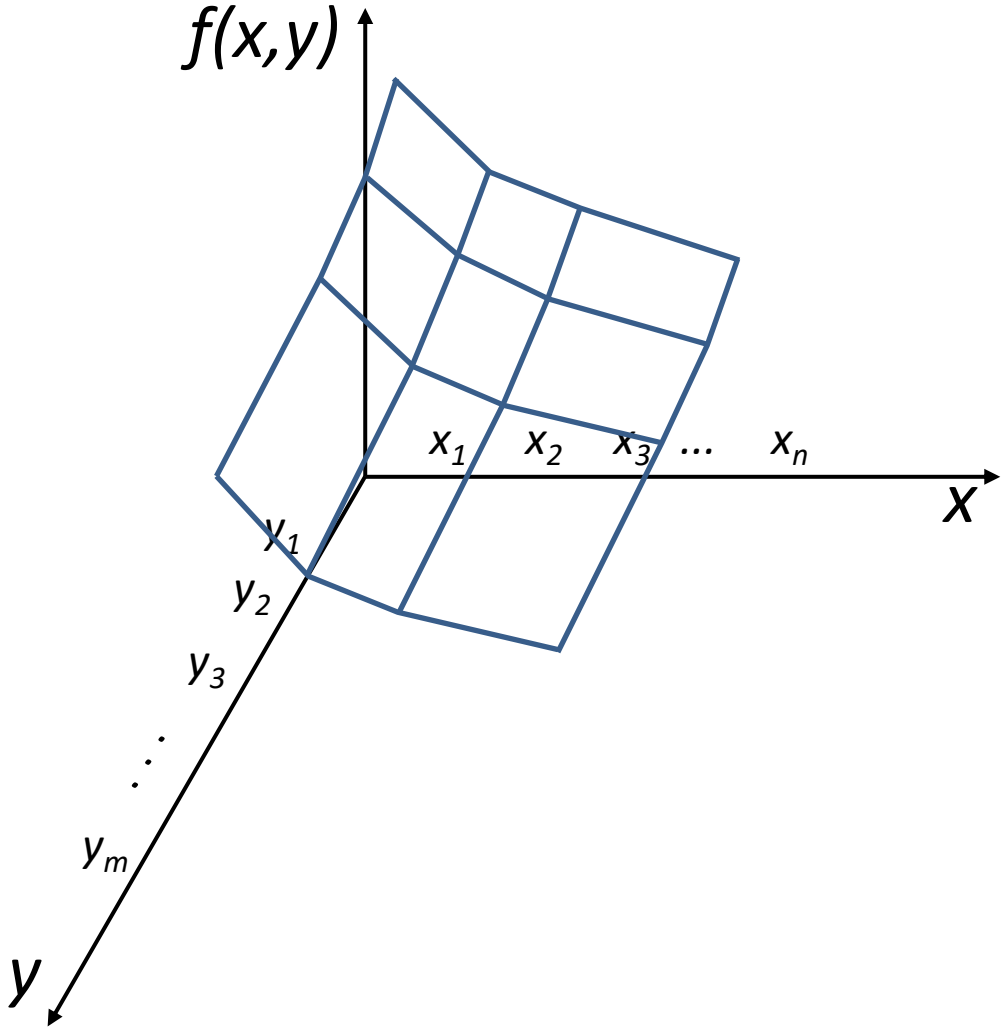
Puntos con un mismo valor de x

Ejercicio 2: Graficar



La altura de los puntos es proporcional al valor de la función

Ejercicio 2: Graficar



Ejemplo utilizando plot3d: $f(x,y) = x^2 + y^2$

plot3d

3D plot of a surface

Syntax

```
plot3d(x,y,z,[theta,alpha,leg,flag,ebox])
plot3d(x,y,z,<opt_args>)
```

x,y

row vectors of sizes n1 and n2 (x-axis and y-axis coordinates). These coordinates must be monotone.

z

matrix of size (n1,n2). `z(i,j)` is the value of the surface at the point (x(i),y(j)).

Ejemplo utilizando plot3d: $f(x,y) = x^2 + y^2$

x: $x_1, x_2, x_3, \vdots, x_n$

y: $y_1, y_2, y_3, \vdots, y_m$

$z=f(x,y)$

$$\begin{matrix} f(x_1,y_1) & f(x_1,y_2) & \cdots & f(x_1,y_m) \\ f(x_2,y_1) & f(x_2,y_2) & & f(x_2,y_m) \\ f(x_3,y_1) & f(x_3,y_2) & \cdots & f(x_3,y_m) \\ \vdots & \vdots & & \vdots \\ f(x_n,y_1) & f(x_n,y_2) & \cdots & f(x_n,y_m) \end{matrix}$$

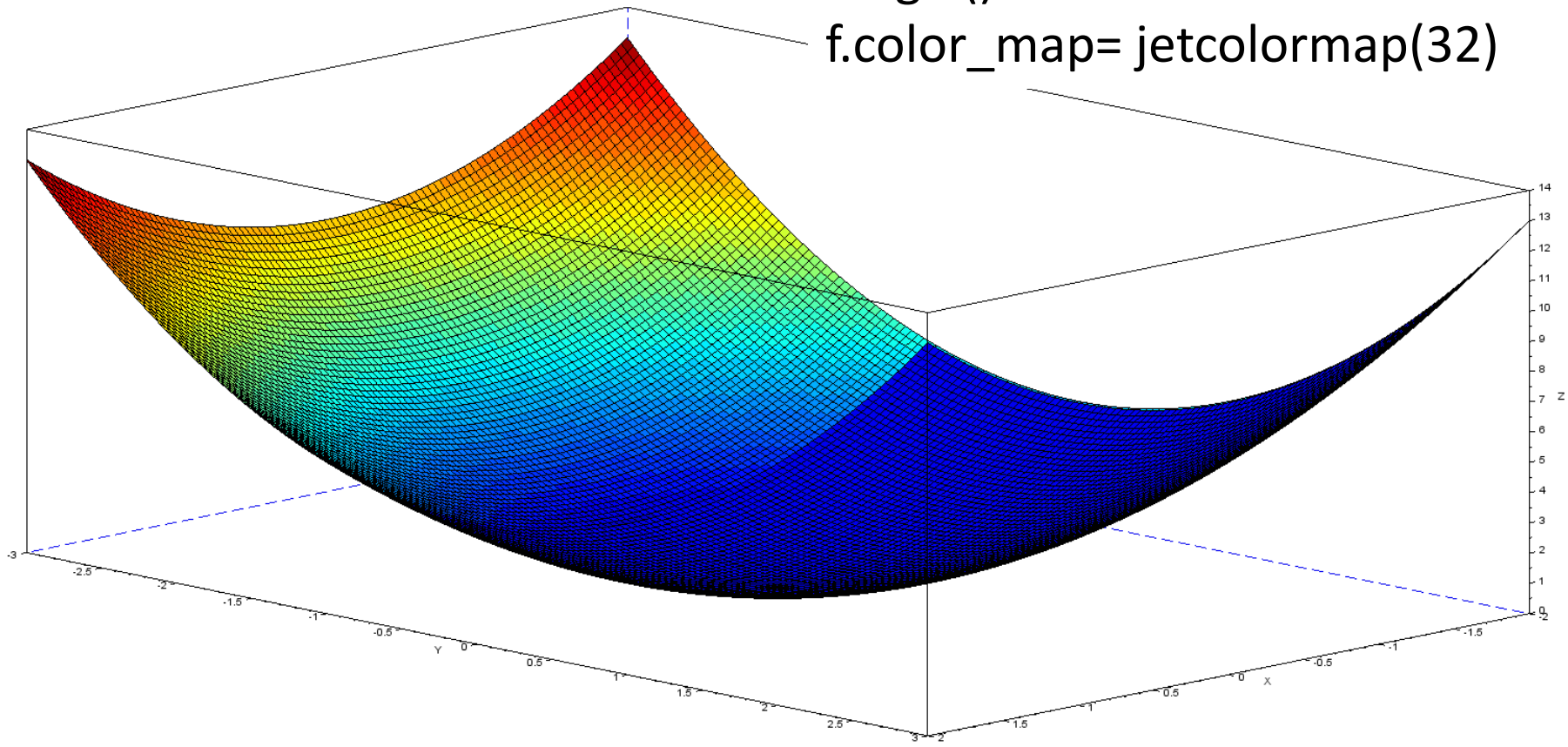
```
x=linspace(-2,2,100);
y=linspace(-3,3,150);
```

```
for i=1:length(x)
        for j=1:length(y)
                z(i,j)=x(i)^2+ y(j)^2;
        end
end
```

Al usar plot3d z(i,j)=f(x(i),y(j))

Ejemplo: $f(x,y) = x^2 + y^2$

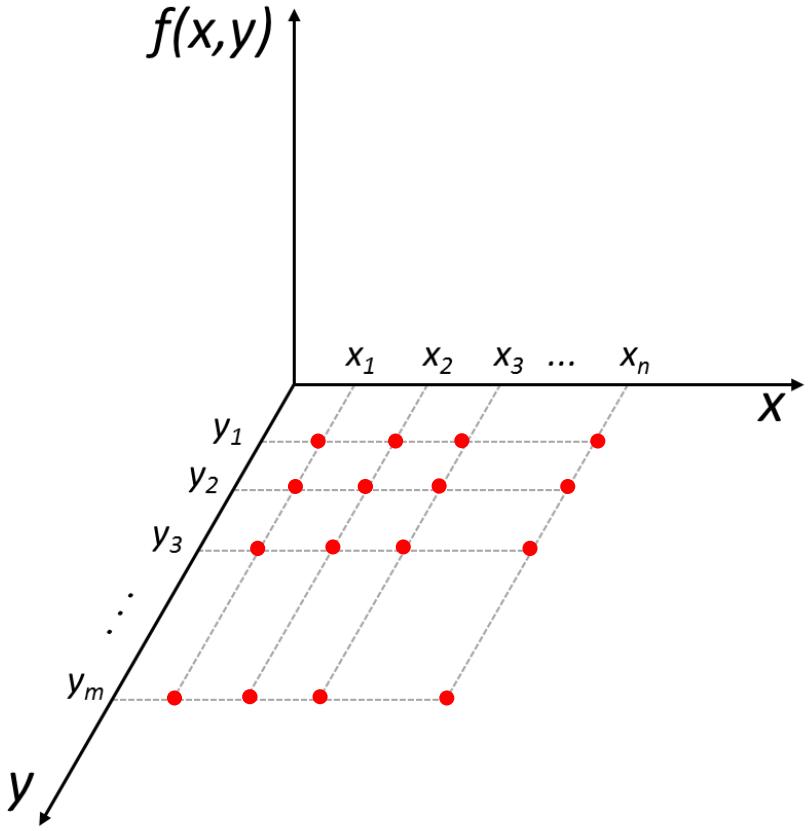
```
plot3d( x, y, z);
e = gce();
e.color_flag = 1;
f = gcf()
f.color_map= jetcolormap(32)
```



Ejemplo utilizando mesh: $f(x,y) = x^2 + y^2$

$$\begin{pmatrix} x_1 & x_2 & x_3 & \cdots & x_n \\ x_1 & x_2 & x_3 & \cdots & x_n \\ x_1 & x_2 & x_3 & \cdots & x_n \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ x_1 & x_2 & x_3 & \cdots & x_n \end{pmatrix}$$

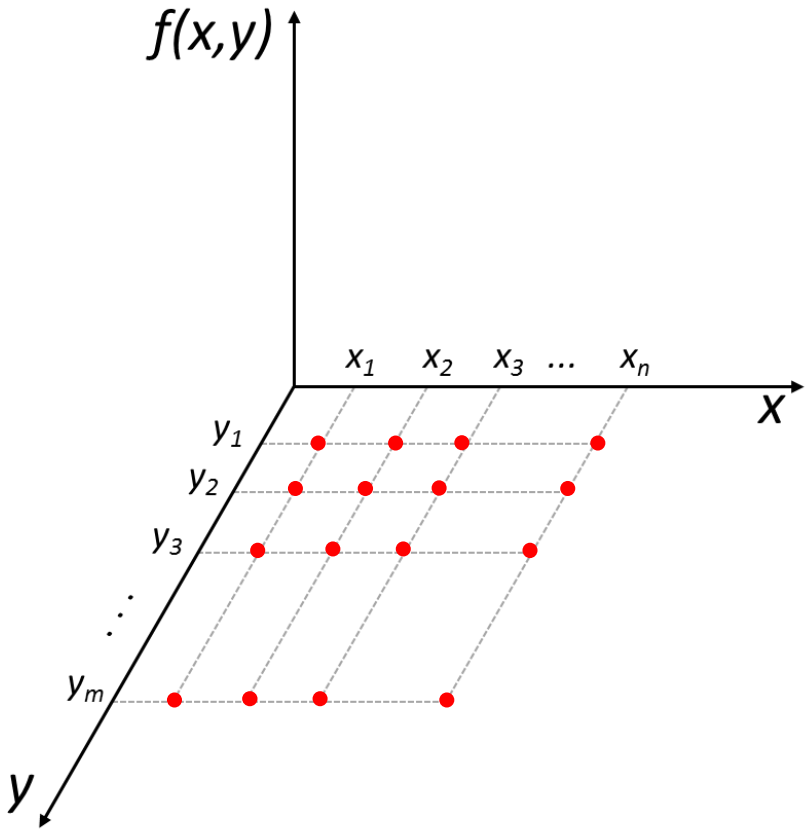
$$m \times n$$



Ejemplo utilizando mesh: $f(x,y) = x^2 + y^2$

$$\begin{pmatrix} y_1 & y_1 & y_1 & \cdots & y_1 \\ y_2 & y_2 & y_2 & \cdots & y_2 \\ y_3 & y_3 & y_3 & \cdots & y_3 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ y_m & y_m & y_m & \cdots & y_m \end{pmatrix}$$

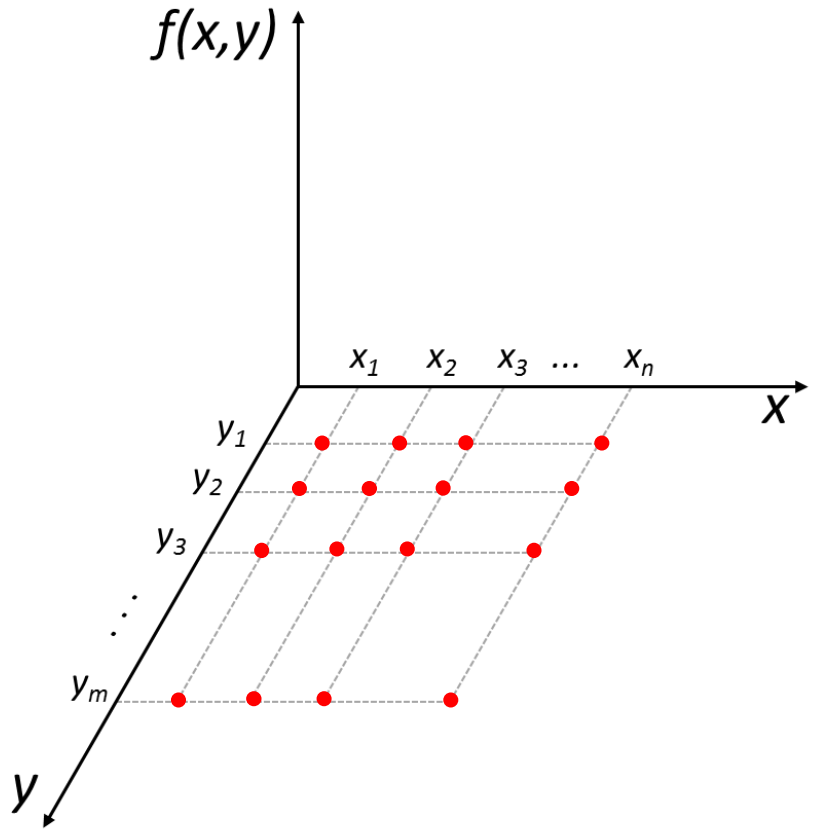
$$m \times n$$



Ejemplo utilizando mesh: $f(x,y) = x^2 + y^2$

$$\begin{bmatrix} f(x_1,y_1) & f(x_2,y_1) & \cdots & f(x_n,y_1) \\ f(x_1,y_2) & f(x_2,y_2) & & f(x_n,y_2) \\ f(x_1,y_3) & f(x_2,y_3) & \cdots & f(x_n,y_3) \\ \vdots & \vdots & & \vdots \\ f(x_1,y_m) & f(x_2,y_m) & \ddots & f(x_n,y_m) \end{bmatrix}$$

Al usar mesh z(i,j)=f(x(j),y(i))



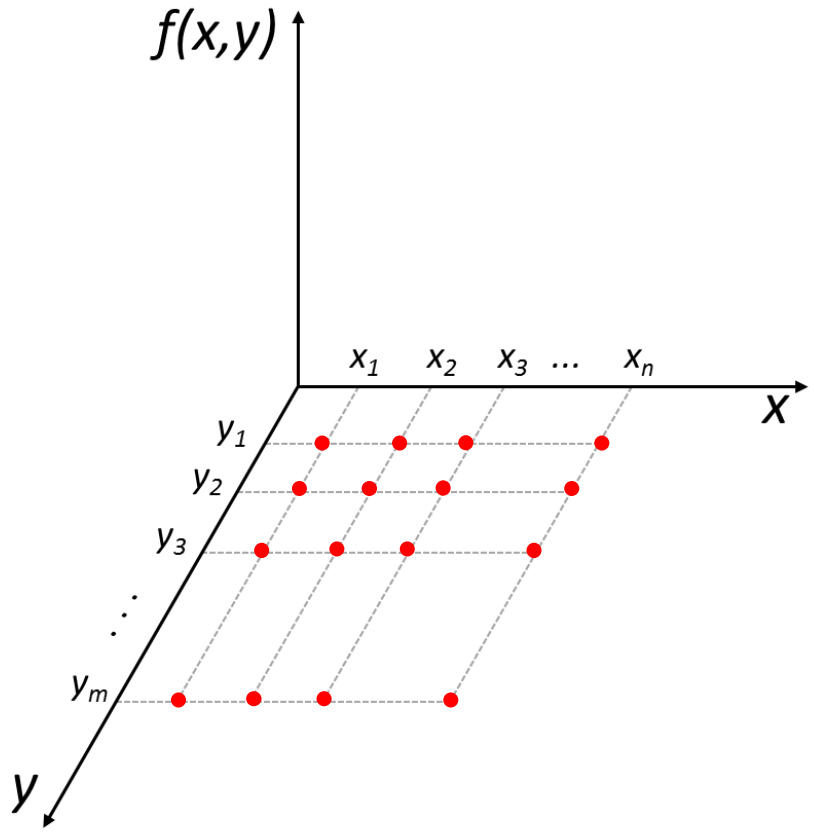
Ejemplo utilizando mesh: $f(x,y) = x^2 + y^2$

```
x=linspace(-2,2,100);
y=linspace(-3,3,150);
[X,Y]=meshgrid(x,y);
Z=X.^2+Y.^2;
mesh(X,Y,Z);
e = gce();
e.color_flag = 1;
f = gcf()
f.color_map= jetcolormap(32)
```

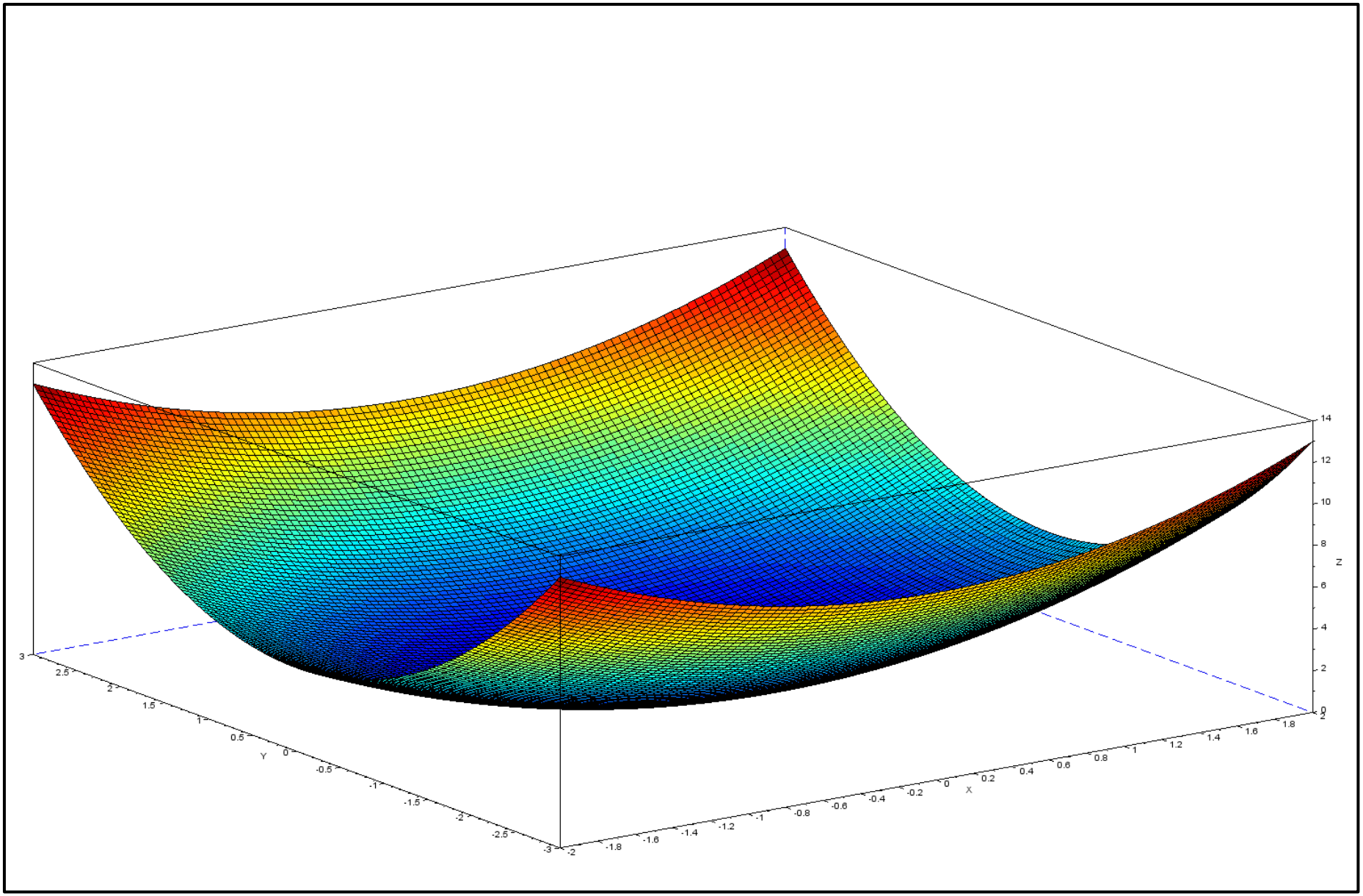
Dominio

Dominio Matricial

Valores de la función



Ejemplo utilizando mesh: $f(x,y) = x^2 + y^2$



Curvas de nivel: $f(x,y) = x^2 + y^2$

```
x=linspace(-2,2,100);
y=linspace(-3,3,150);
for i=1:length(x)
        for j=1:length(y)
                z(i,j)=x(i)^2+ y(j)^2;
        end
end
```

```
contour(x,y,z,10)
```

Curvas de nivel: $f(x,y) = x^2 + y^2$

Syntax

```
contour(x,y,z,nz,[theta,alpha,leg,flag,ebox,zlev])
contour(x,y,z,nz,<opt_args>)
```

x,y

two real row vectors of size n1 and n2.

z

real matrix of size (n1,n2), the values of the function or a Scilab function which defines the surface `z=f(x,y)`.

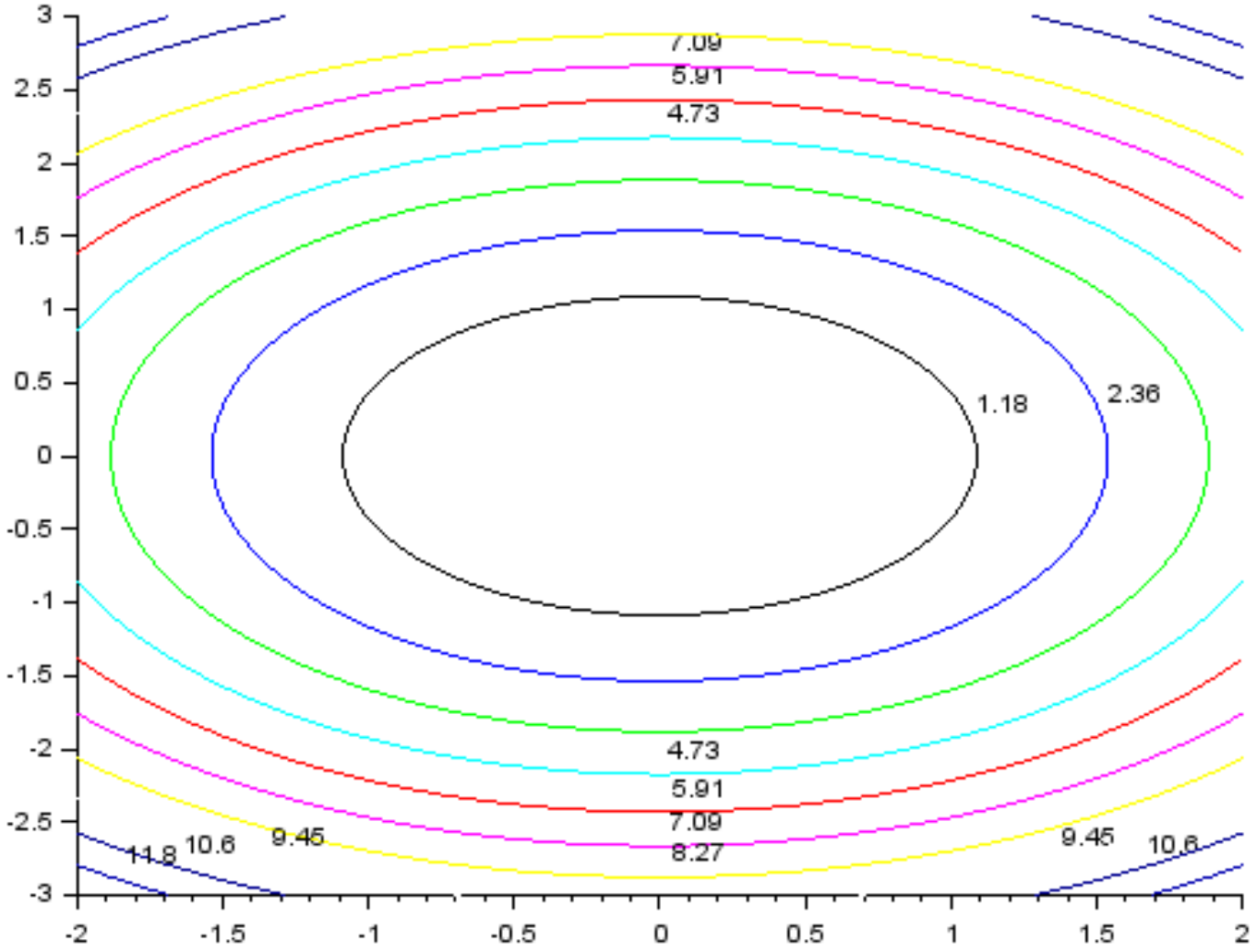
nz

the level values or the number of levels.

Curvas de nivel: $f(x,y) = x^2 + y^2$

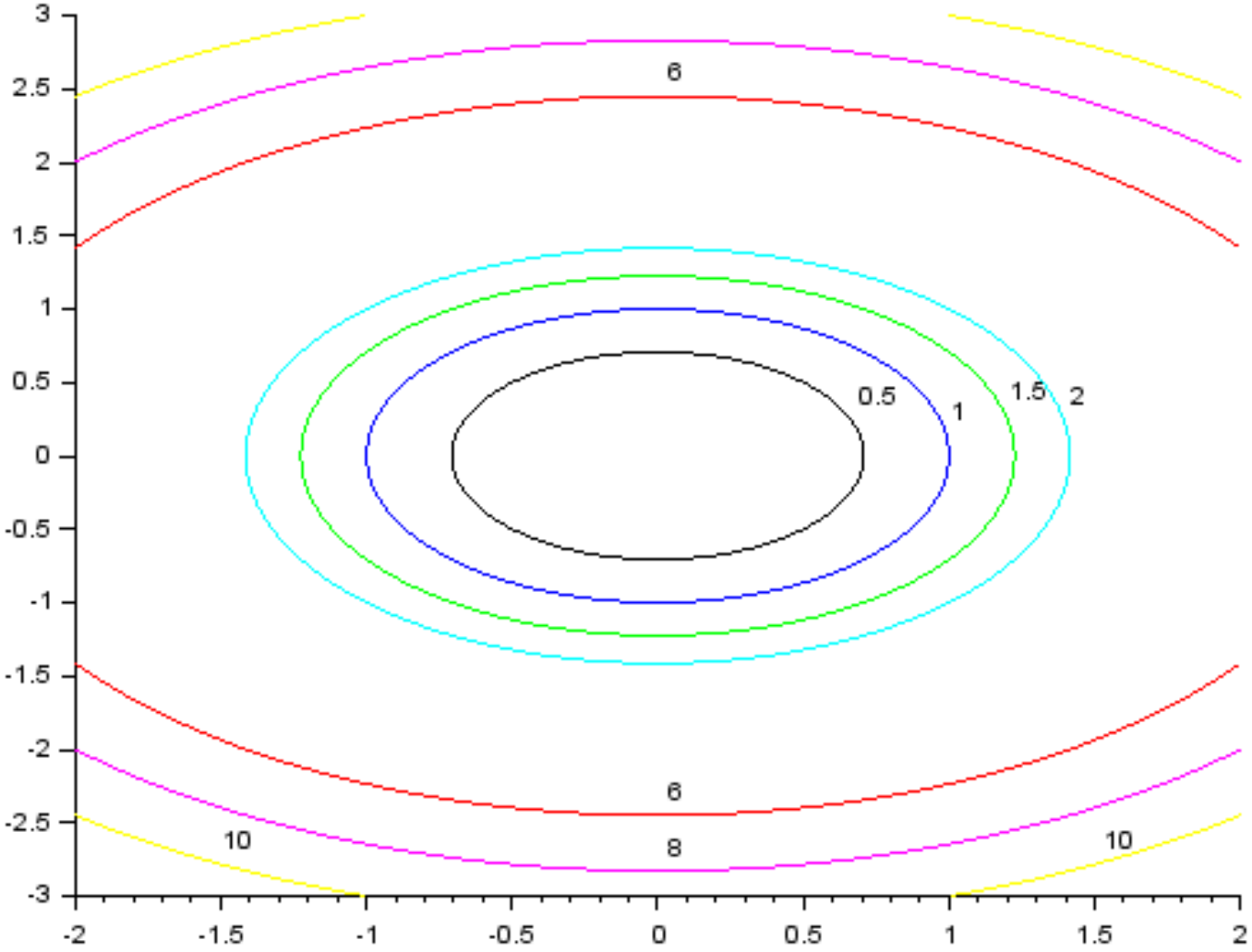
contour(x,y,z,10)

10 curvas de nivel!



Curvas de nivel: $f(x,y) = x^2 + y^2$

contour(x,y,z,[0.5 1 1.5 2 6 8 10]) → 7 curvas de nivel con el valor que le pedimos!



Curvas de nivel: $f(x,y) = x^2 + y^2$

contour(x,y,z,linspace(0.5,10,20)) → 20 curvas de nivel con el valor que le pedimos!