

Grafica 3D

- Note

- Autore

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- Versione

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Maple V Release 6.02 for Windows 2000

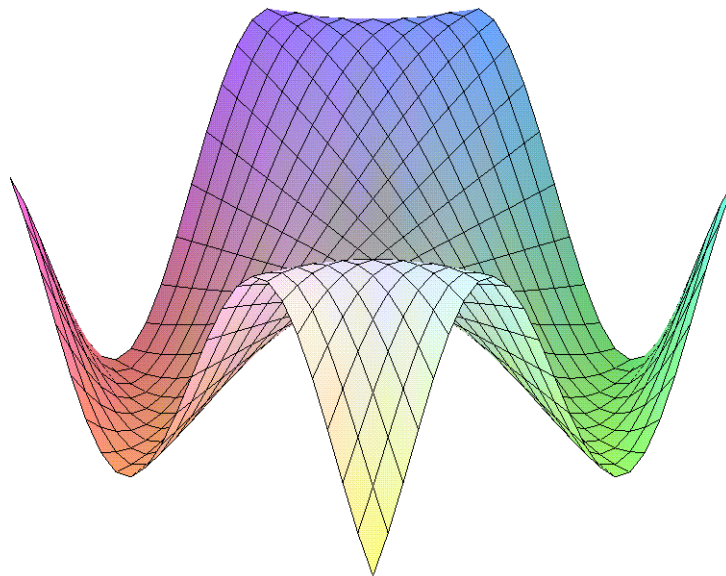
```
> restart;
```

È possibile disegnare una funzione di due variabili come una superficie dello spazio tridimensionale.

```
> f := (x, y) -> sin(x * y);
```

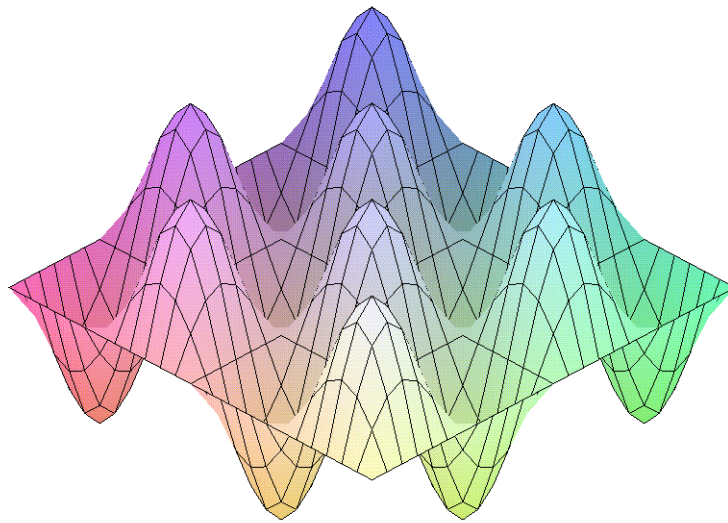
$$f := (x, y) \rightarrow \sin(xy)$$

```
> plot3d(f(x, y), x=-2..2, y=-2..2);
```

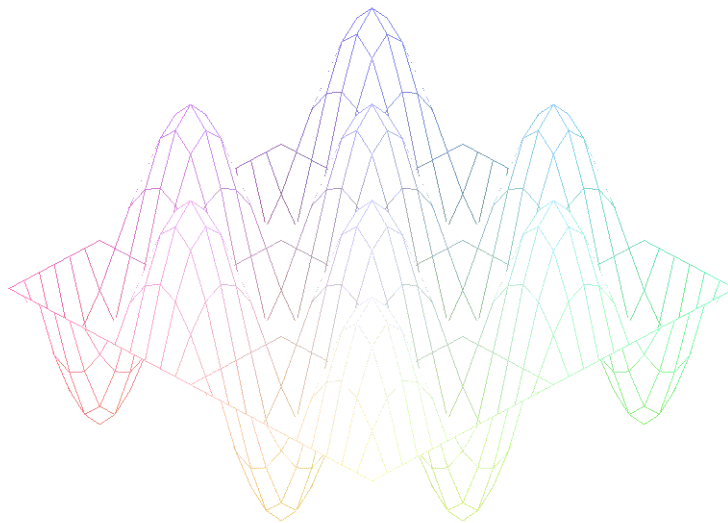


È possibile ruotare il disegno cliccando sulla finestra con il pulsante sinistro del mouse. Cliccando invece con il pulsante destro si possono modificare alcune opzioni per la visualizzazione.

```
> plot3d(sin(x)*sin(y), x=0..4*Pi, y=0..4*Pi);
```

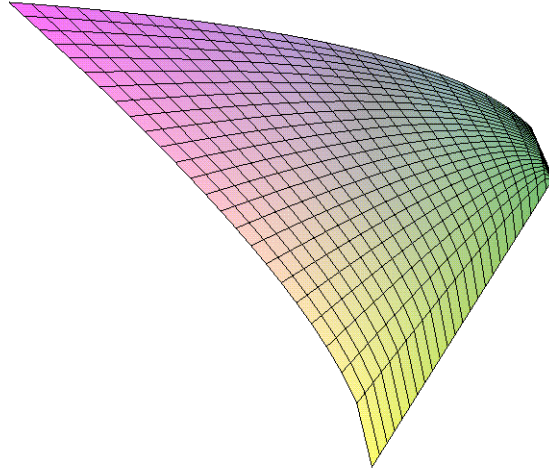


```
> plot3d(sin(x)*sin(y), x=0..4*Pi, y=0..4*Pi, style=hidden);
```



[L'intervallo dei valori del secondo parametro può dipendere dal primo parametro:

```
> plot3d(sqrt(x - y), x=0..9, y=-x..x);
```

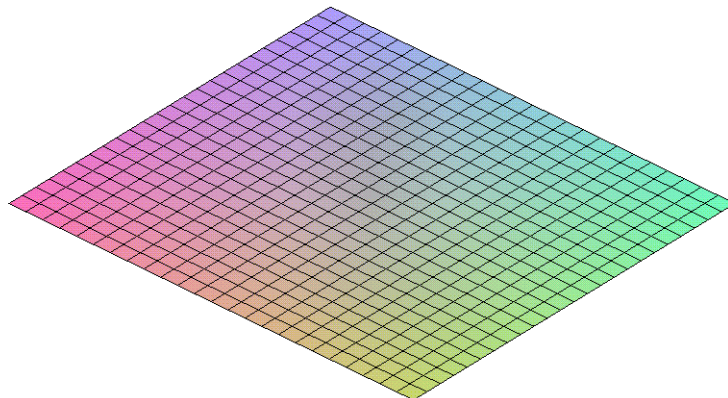


Superfici parametriche

Non tutte le superfici possono essere espresse mediante un'equazione della forma $z = f(x, y)$ (la sfera è una di queste superfici). Si può allora esprimere ognuna delle coordinate x, y, z in funzione di due parametri s e t (si pensi, per esempio, all'equazione parametrica vettoriale di un piano).

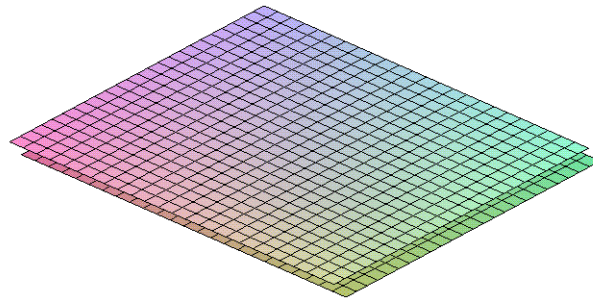
Un piano:

```
> plot3d([1 + 2*s + 3*t, 1 - 5*s - 2*t, 3 + s - t], s=-5..5,  
t=-5..5);
```

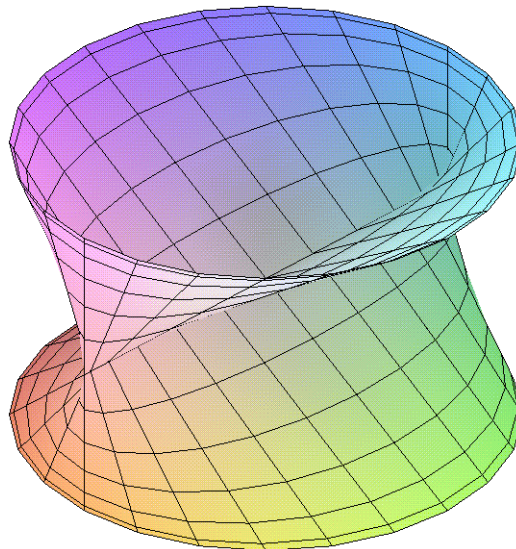


[Due piani paralleli:

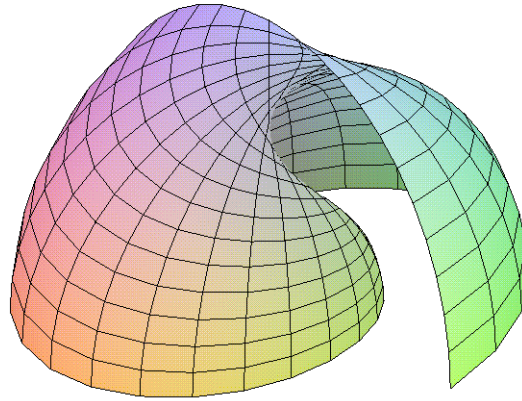
```
> plot3d({[1 + 2*s + 3*t, 1 - 5*s - 2*t, 3 + s - t], [15 + 2*s + 3*t, 17 - 5*s - 2*t, 13 + s - t]}, s=-5..5, t=-5..5);
```



```
> plot3d([sin(s), cos(s)*sin(t), sin(t)], s=-Pi..Pi, t=-Pi..Pi);
```



```
> plot3d([s*sin(s)*cos(t), s*cos(s)*cos(t), s*sin(t)], s=0..2*Pi, t=0..Pi);
```



Coordinate sferiche

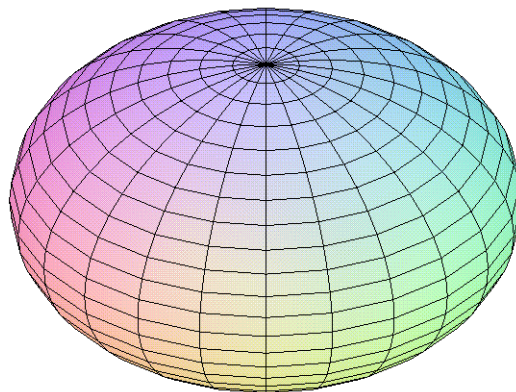
Per usare le coordinate sferiche bisogna caricare la libreria "plots".

```
> with(plots):
```

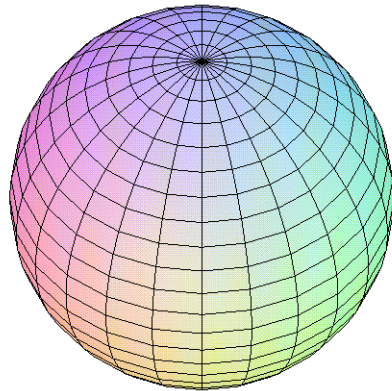
```
Warning, the name changecoords has been redefined
```

La sfera unitaria:

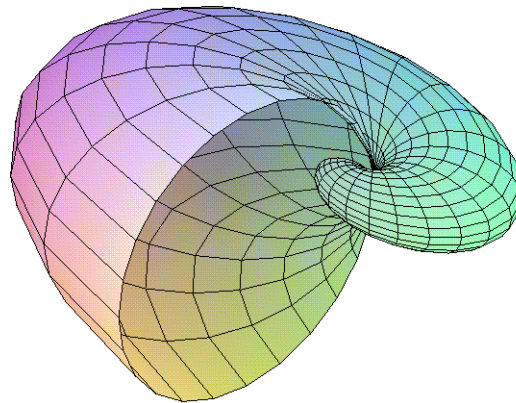
```
> sphereplot(1, theta=0..2*Pi, phi=0..Pi);
```



```
> sphereplot(1, theta=0..2*Pi, phi=0..Pi, scaling=constrained);
```

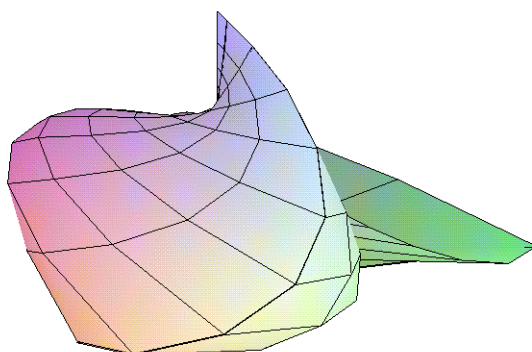


```
> sphereplot((4/3)^theta*sin(phi), theta=-1..2*Pi, phi=0..Pi);
```



[Si possono disegnare grafici di funzioni parametriche anche in coordinate sferiche:

```
> sphereplot([exp(s)+t, cos(s+t), t^2], s=0..2*Pi, t=-2..2);
```



[*Coordinate cilindriche*

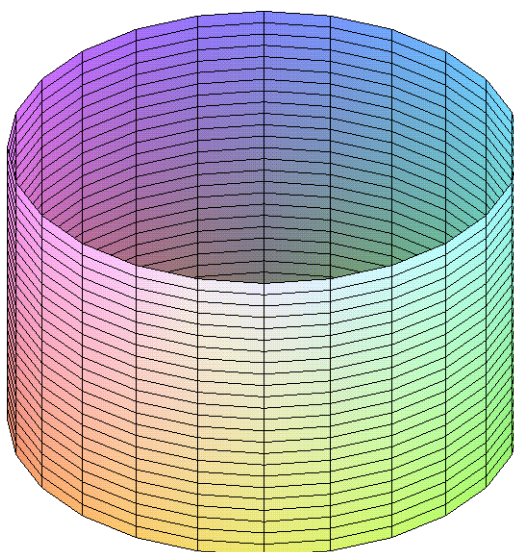
[Per usare le coordinate cilindriche bisogna caricare la libreria "plots".

```
[ > restart: with(plots):
```

```
Warning, the name changecoords has been redefined
```

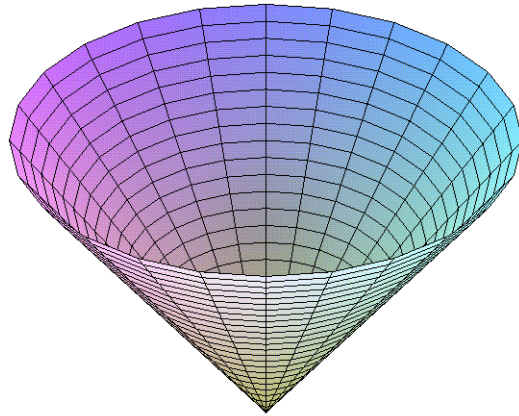
[Un cilindro:

```
[ > cylinderplot(1, theta=0..2*Pi, z=0..1);
```



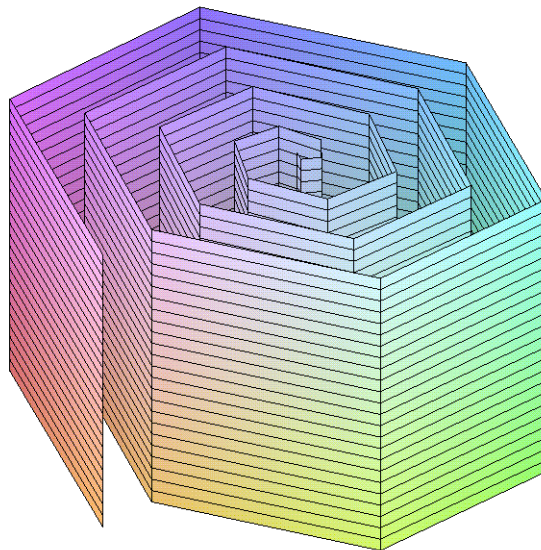
[Un cono:

```
> cylinderplot(z, theta=0..2*Pi, z=0..1);
```

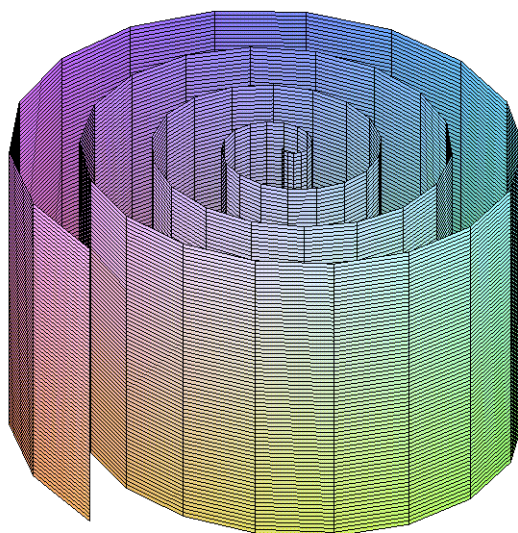


[Versione 3D della spirale:

```
> cylinderplot(theta, theta=0..8*Pi, z=-1..1);
```

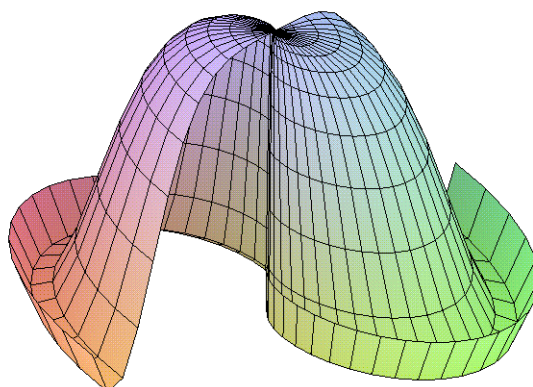


```
> cylinderplot(theta, theta=0..8*Pi, z=-1..1, numpoints=5000);
```



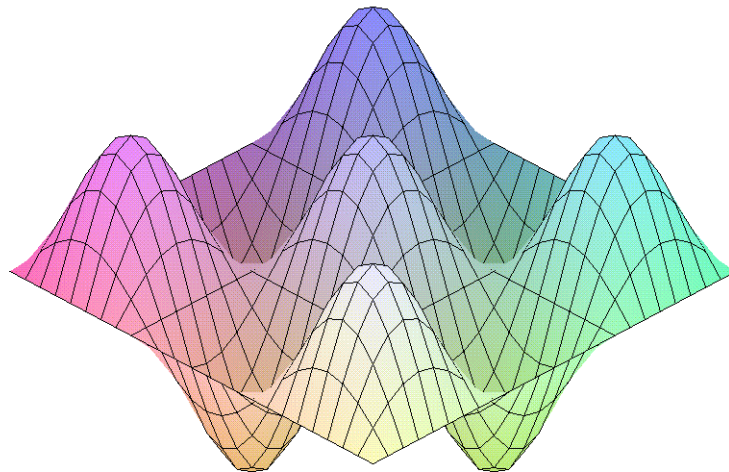
[Si possono disegnare grafici di funzioni parametriche anche in coordinate cilindriche:

```
> cylinderplot([s*t, s, cos(t^2)], s=0..Pi, t=-2..2);
```

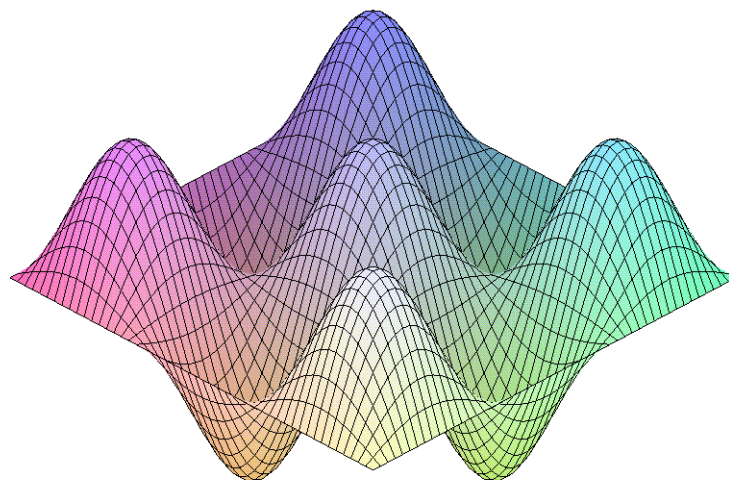


[*Migliorare la risoluzione*

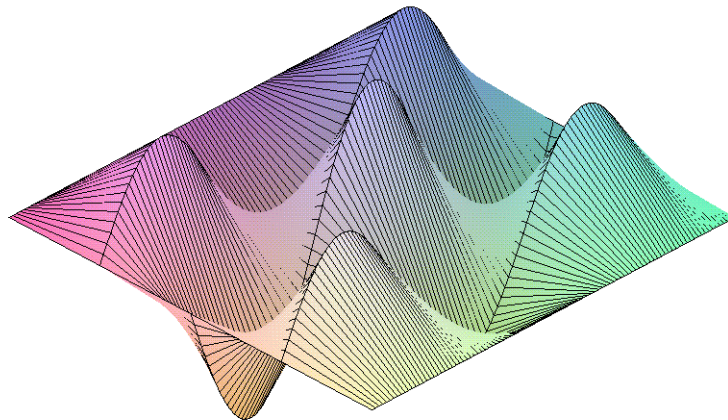
```
> plot3d(sin(x)*sin(y), x=0..3*Pi, y=0..3*Pi);
```



```
> plot3d(sin(x)*sin(y), x=0..3*Pi, y=0..3*Pi, grid=[50,50]);
```

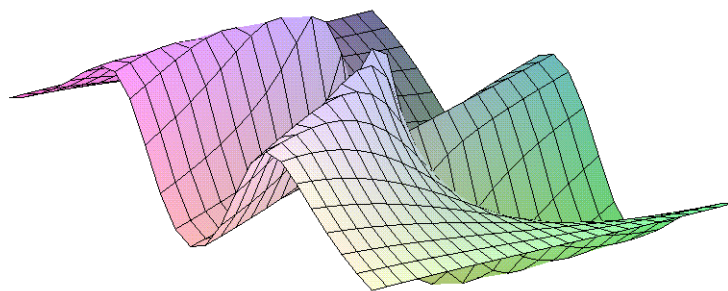


```
> plot3d(sin(x)*sin(y), x=0..3*Pi, y=0..3*Pi, grid=[100,5]);
```

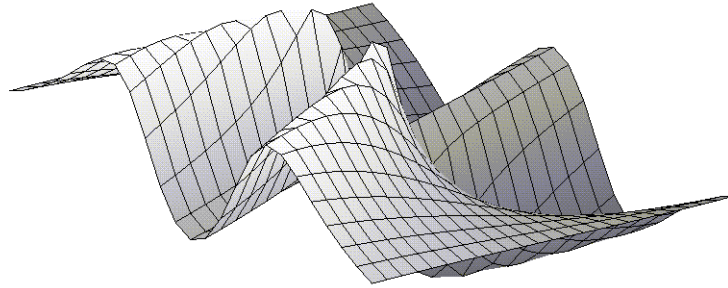


Schemi di illuminazione

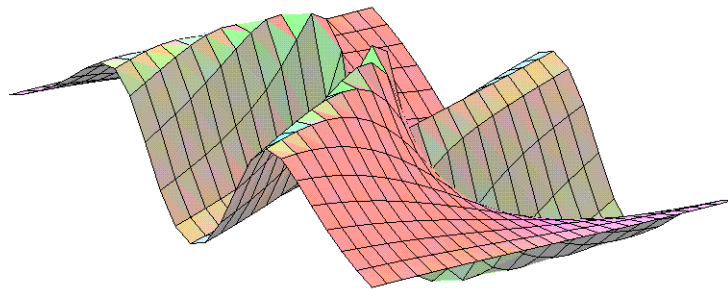
```
> plot3d(x*y^2/(x^2 + y^4), x=-5..5, y=-5..5);
```



```
> plot3d(x*y^2/(x^2 + y^4), x=-5..5, y=-5..5, shading=zgrayscale,  
lightmodel=none);
```



```
> plot3d(x*y^2/(x^2 + y^4), x=-5..5, y=-5..5, shading=none,  
lightmodel=light1);
```



```
> plot3d(x*y^2/(x^2 + y^4), x=-5..5, y=-5..5, shading=none,  
lightmodel=light2);
```

