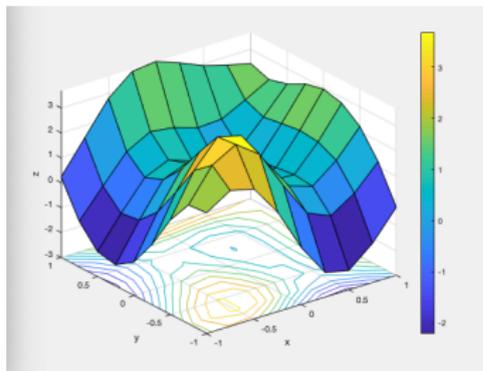
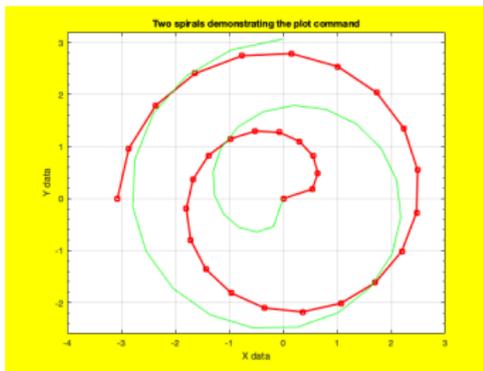


Punti, Curve e Superfici in MATLAB

Eugenio G. Omodeo

Trieste, 23.11.2021



ESEMPIO 'PENTA_E_MAGENTA'

```
>> close all, plot(3,'p'),figure,plot(3i+1,'m*')
```

Figure 1

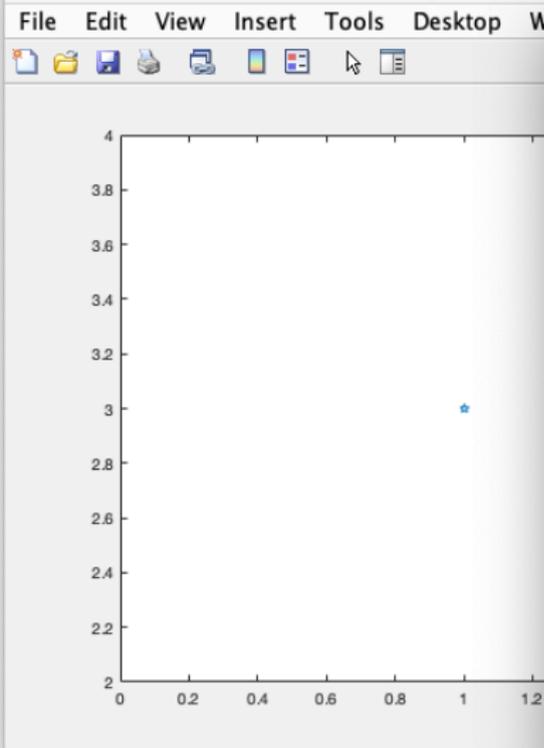
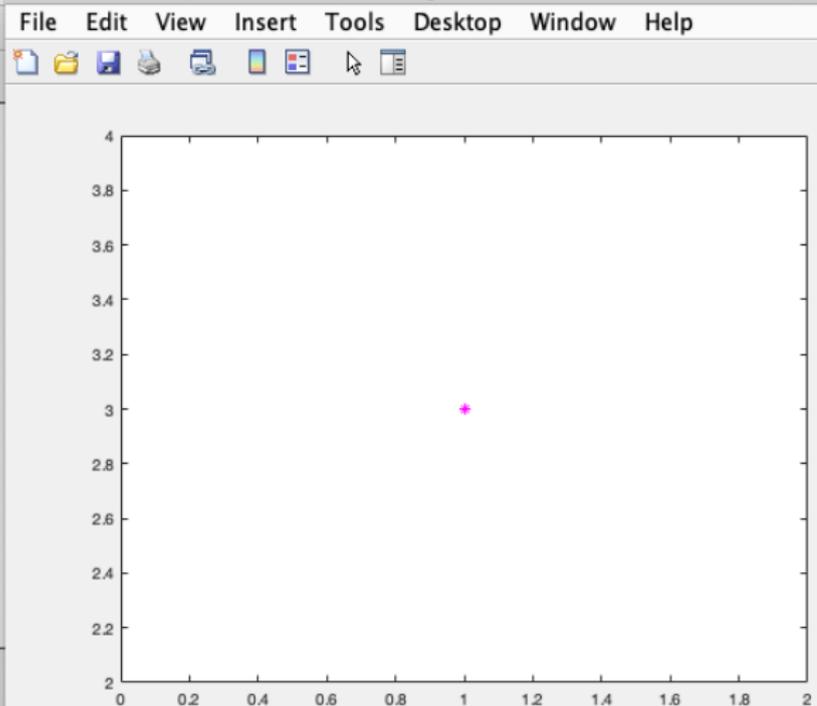


Figure 2



CHE SIGNIFICA 'plot' ?

```
>> help plot
```

```
plot Linear plot.
```

plot(X,Y) plots vector Y versus vector X. If X or Y is a matrix, then the vector is plotted versus the rows or columns of the matrix, whichever line up. If X is a scalar and Y is a vector, disconnected line objects are created and plotted as discrete points vertically at X.

plot(Y) plots the columns of Y versus their index.

If Y is complex, **plot(Y)** is equivalent to **plot(real(Y),imag(Y))**.

In all other uses of **plot**, the imaginary part is ignored.

Various line types, plot symbols and colors may be obtained with **plot(X,Y,S)** where S is a character string made from one element from any or all the following 3 columns:

b	blue	.	point	-	solid
g	green	o	circle	:	dotted
r	red	x	x-mark	-.	dashdot
c	cyan	+	plus	--	dashed
m	magenta	*	star	(none)	no line
y	yellow	s	square		
k	black	d	diamond		
w	white	v	triangle (down)		
		^	triangle (up)		
		<	triangle (left)		
		>	triangle (right)		
		p	pentagram		
		h	hexagram		

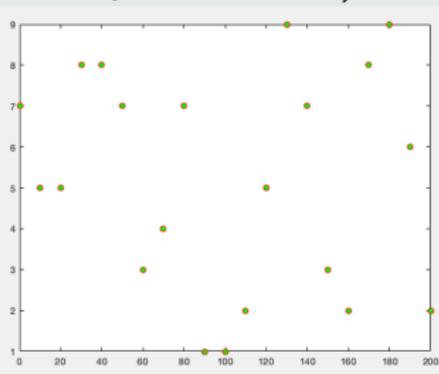
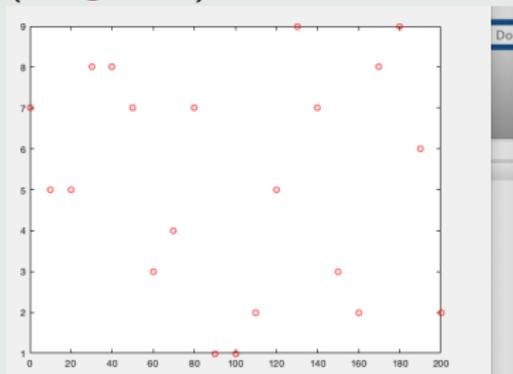
CHE SIGNIFICA 'plot' ?

ESERCIZIO: RIEMPIRE I MARKER

Supponendo che x ed y siano tali che il comando

» `figure, plot(x,y,'or')`

produca la figura qui sotto a sinistra, modificate il comando per ottenere la figura di destra (suggerim.: documentarsi su `'markerfacecolor'`—e, volendo un colore diverso da quelli predefiniti (`r` e `g`, ecc.), su come introdurre colori personalizzati).



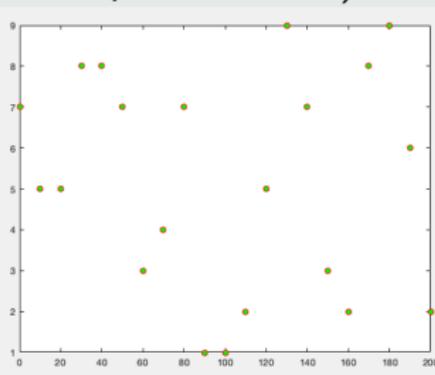
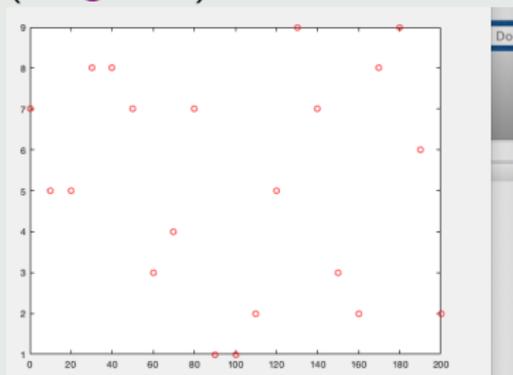
CHE SIGNIFICA 'plot' ?

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» `plot(0:10:200,floor(rand(1,21)*10),'ob','markerfacecolor',[1,0,1])`

ESEMPIO: PUNTEGGIARE QUALCHE RETTA

For example, `plot(X,Y,'c+:')` plots a cyan dotted line with a plus at each data point; `plot(X,Y,'bd')` plots blue diamond at each data point but does not draw any line.

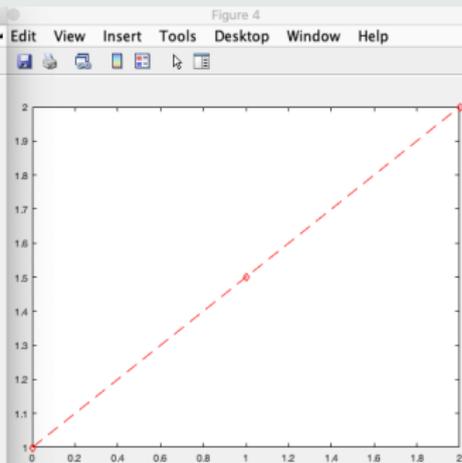
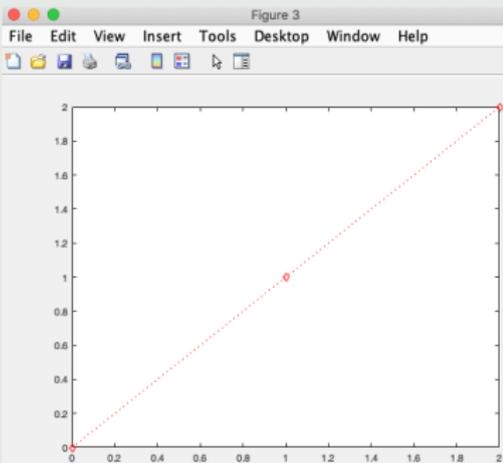
`plot(X1,Y1,S1,X2,Y2,S2,X3,Y3,S3,...)` combines the plots defined by the (X,Y,S) triples, where the X's and Y's are vectors or matrices and the S's are strings.

```
>> close all, figure, figure, figure,  
>> plot([0,1,2],[0,1,2],'rd:'), figure, plot([0,1,2],[1,1.5,2],'rd--'),  
>> figure, plot([0,1,2],[1,1.5,2],'bd:'), axis equal,  
>> hold on, plot([0,1,2],[1,1.2,2],'md:'),
```

CHE SIGNIFICA 'plot' ?

ESEMPIO: PUNTEGGIARE QUALCHE RETTA

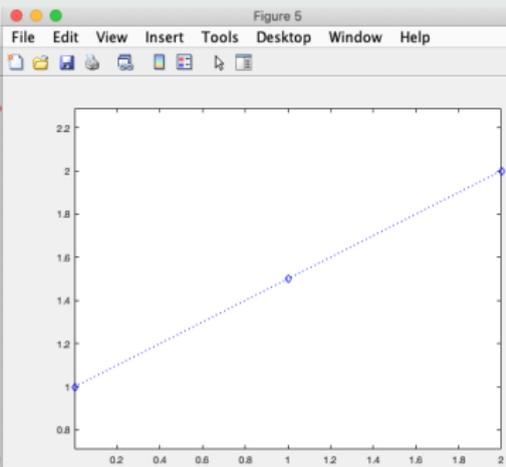
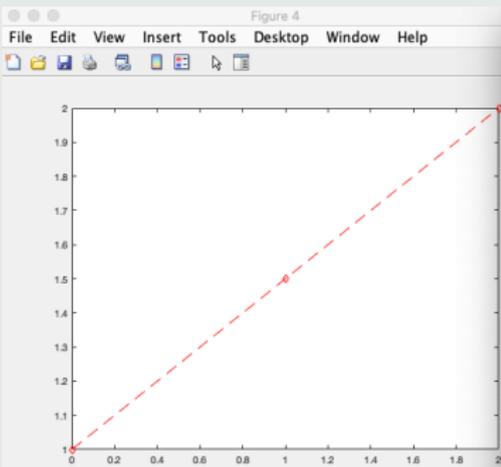
```
>> close all, figure, figure, figure,  
>> plot([0,1,2],[0,1,2],'rd:'), figure, plot([0,1,2],[1,1.5,2],'rd--'),  
>> figure, plot([0,1,2],[1,1.5,2],'bd:'), axis equal,  
>> hold on, plot([0,1,2],[1,1.2,2],'md:'),
```



CHE SIGNIFICA 'plot' ?

ESEMPIO: PUNTEGGIARE QUALCHE RETTA

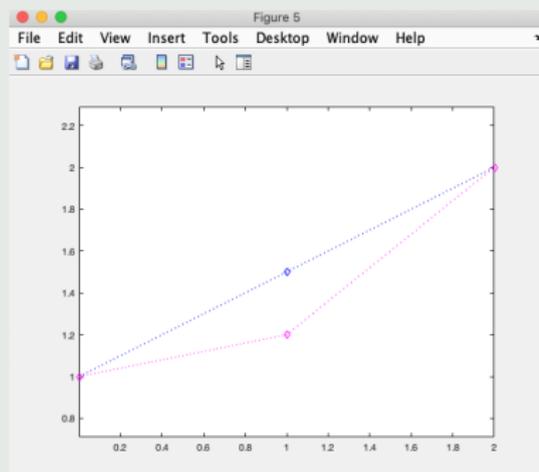
```
>> close all, figure, figure, figure,  
>> plot([0,1,2],[0,1,2],'rd:'), figure, plot([0,1,2],[1,1.5,2],'rd--'),  
>> figure, plot([0,1,2],[1,1.5,2],'bd:'), axis equal,  
>> hold on, plot([0,1,2],[1,1.2,2],'md:'),
```



CHE SIGNIFICA 'plot' ?

ESEMPIO: PUNTEGGIARE QUALCHE RETTA

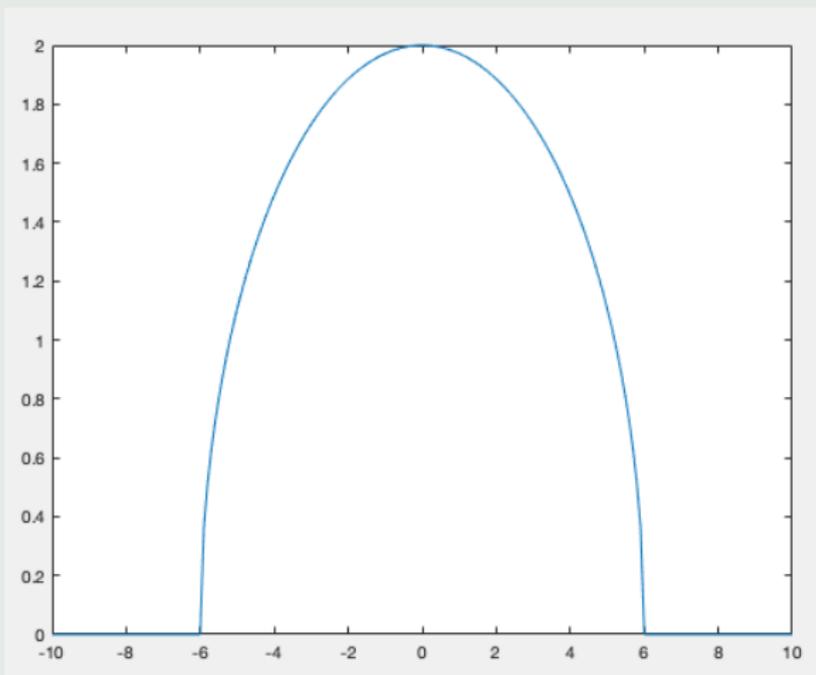
```
>> close all, figure, figure, figure,  
>> plot([0,1,2],[0,1,2],'rd:'), figure, plot([0,1,2],[1,1.5,2],'rd--'),  
>> figure, plot([0,1,2],[1,1.5,2],'bd:'), axis equal,  
>> hold on, plot([0,1,2],[1,1.2,2],'md:'),
```



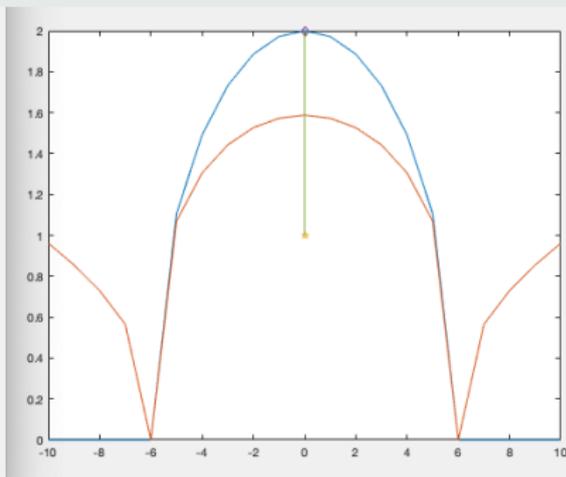
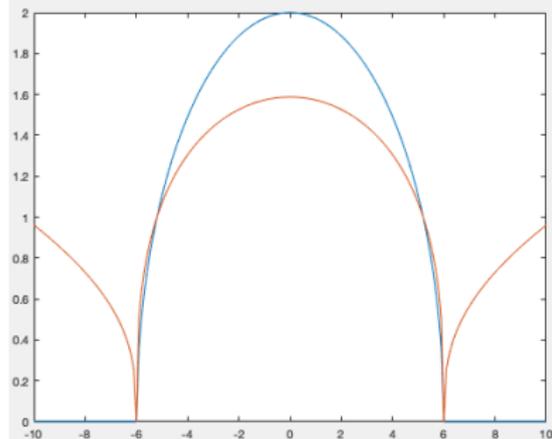
ESEMPIO: TRACCIAMO LA CURVA $y = \sqrt{\frac{36-x^2}{9}}$

```
>> x=-10:0.1:10; y=((36-x.^2)/9).^0.5; plot(x,y);
```

Warning: Imaginary parts of complex X and/or Y arguments ignored



ESERCIZIO: RIPRODURRE QUESTI DUE *plot*

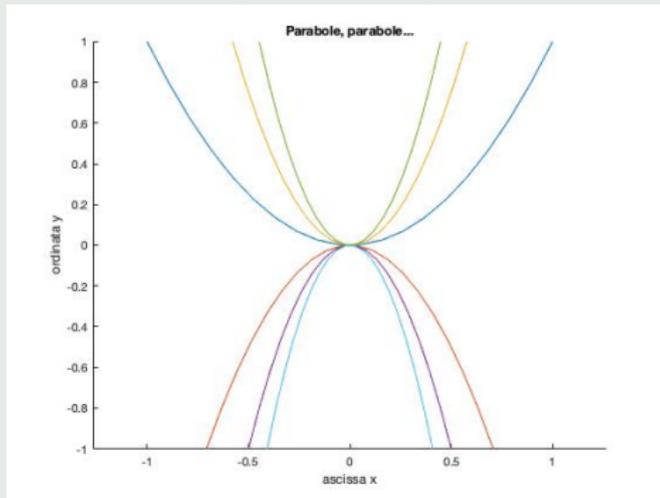


Suggerimento: Per la nuova curva, utilizzare la funzione

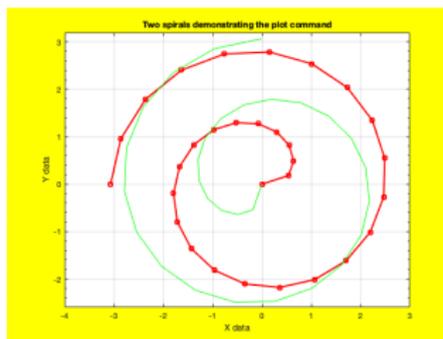
$$v = \sqrt[3]{\frac{36 - u^2}{9}}$$

RAFFIGURAZIONE DI PARABOLE

Dopo esservi documentati sulle funzioni polinomiali (per esempio `qui`) e sui comandi `hold on`, `title`, `xlabel`, `ylabel`, ecc. di **MATLAB**), create un'immagine come questa:



Un modo per ottenere

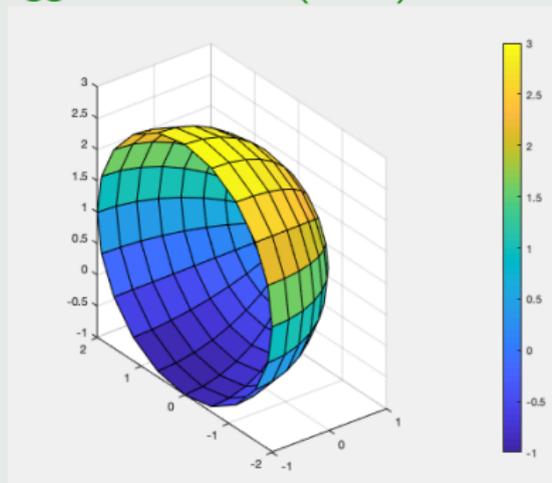


è di eseguire:

```
figure; set(gcf,'color',[1,1,0]); set(gca); t = linspace(0,3*pi,30);
x = sqrt(t) .* cos(t); y = sqrt(t) .* sin(t); h=plot(x,y);
set(h,'color',[1,0,0]); set(h,'marker','square'); set(h,'linewidth',2);
x1=-y; y1=-x; hold on; h1=plot(x1,y1,'g');
xlabel('X data'); ylabel('Y data'),
title('Two spirals demonstrating the plot command');
set(gca,'yminortick','on'); set(gca,'ylim',[-2.6,3.2]);
set(gca,'ygrid','on'); set(gca,'xgrid','on')
```

RAFFIGURARE UNA SEMISFERA IN VERTICALE

Come posso ottenere una semisfera verticale di raggio 1 e centro $(0,0,0)$ in MATLAB?



... Segue qualche indicazione ...

RAFFIGURIAMO UNA SFERA A GRANA GROSSA E UNA FINE

```
>> help sphere
```

sphere Generate sphere.

`[X,Y,Z] = sphere(N)` generates three (N+1)-by-(N+1) matrices so that `SURF(X,Y,Z)` produces a unit sphere.

`[X,Y,Z] = sphere` uses `N = 20`.

`sphere(N)` and just `sphere` graph the sphere as a SURFACE and do not return anything.

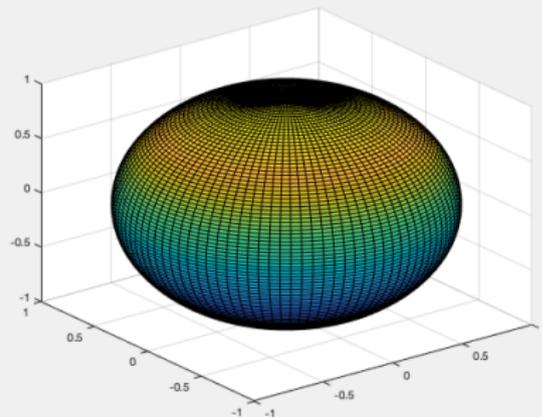
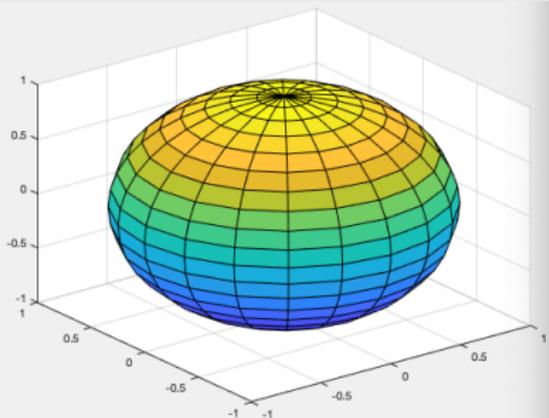
`sphere(AX,...)` plots into AX instead of GCA.

See also [ellipsoid](#), [cylinder](#).

[Reference page for sphere](#)

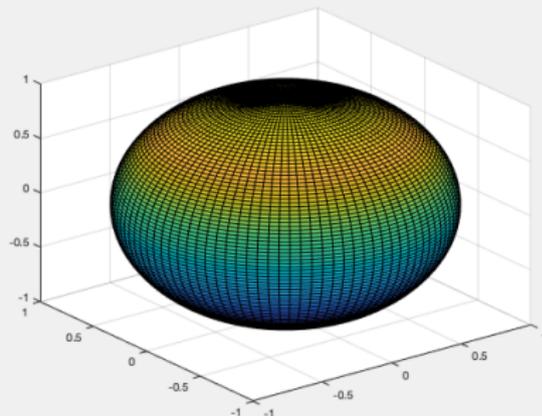
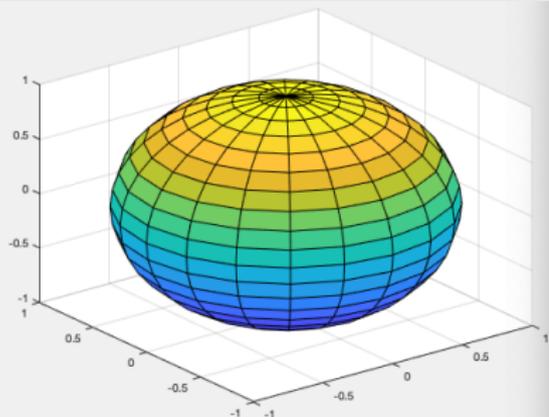
```
>> [u,v,w] = sphere; figure; surf(u,v,w);  
>> [u,v,w]=sphere(100); figure; surf(u,v,w);
```

RAFFIGURIAMO UNA SFERA A GRANA GROSSA E UNA FINE



... Perché appaiono così schiacciate ? ...

RAFFIGURIAMO UNA SFERA A GRANA GROSSA E UNA FINE



... Perché appaiono così schiacciate ? ...

ESERCIZIO: *Evitare lo schiacciamento*