



**SKILLPILLS**

**Let's create some  
pretty plots!**

Albert Benseny Cases



# Making pretty plots 101



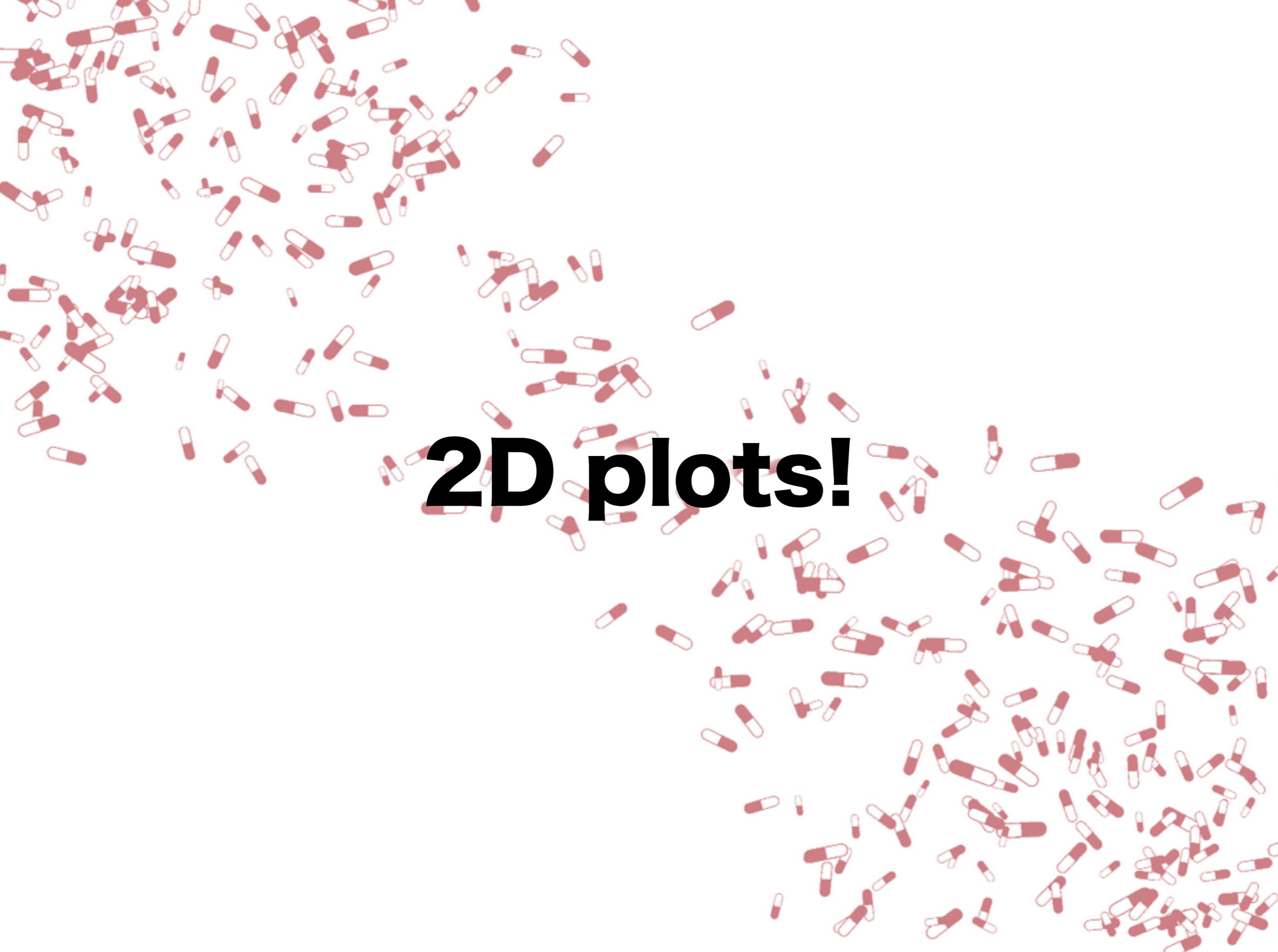
2D plots

3D plots

More useful stuff

Vector plots



The background of the slide is filled with a dense, scattered pattern of red and white capsules, resembling a 2D plot of data points. The capsules are oriented in various directions and are distributed across the entire frame.

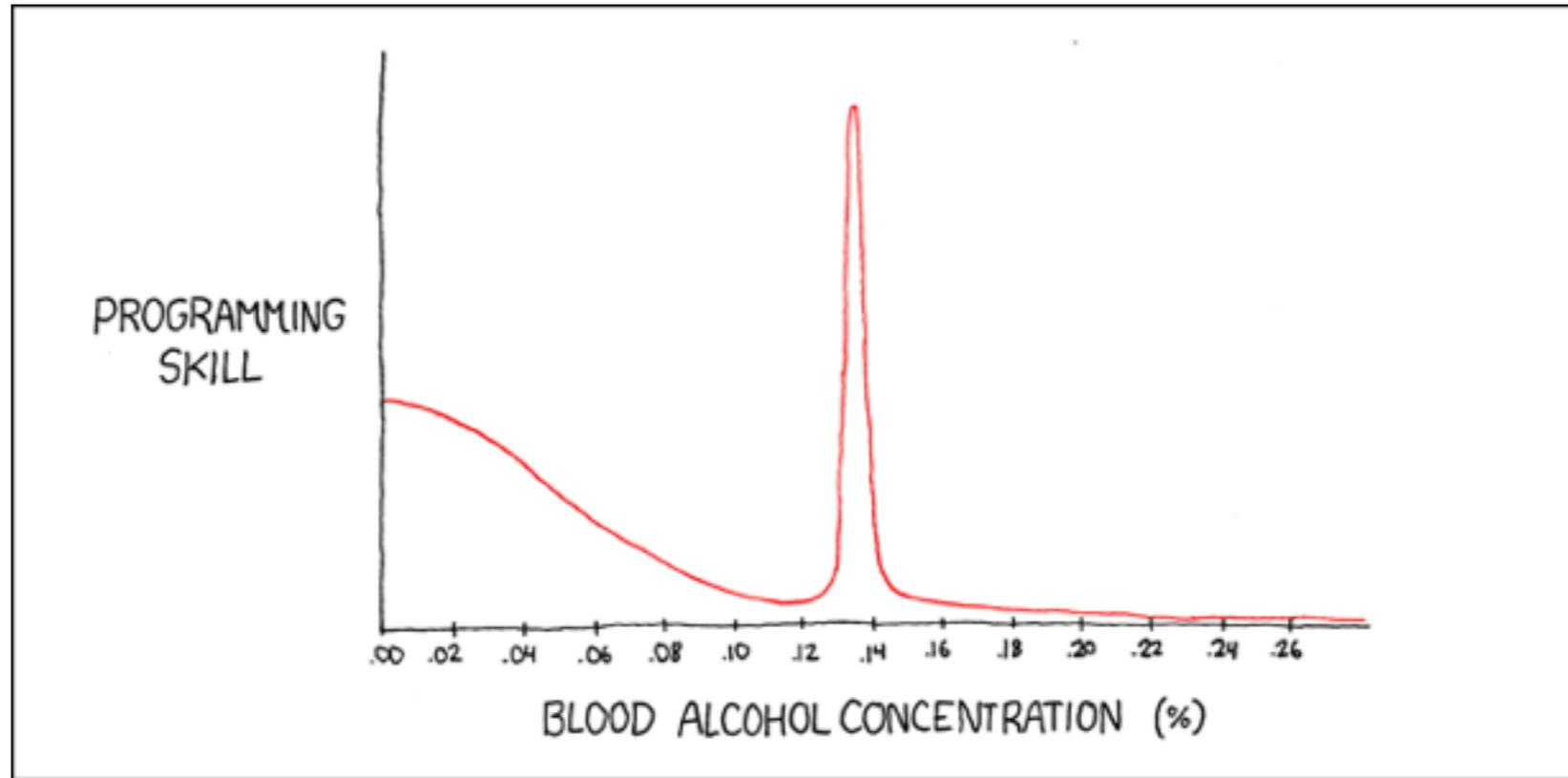
**2D plots!**

# Line plots

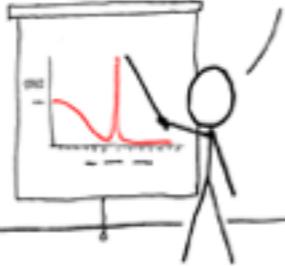
- `plot(y)` will plot `y`.
- `plot(x, y)` will plot `y` vs `x`.
- `axis([xmin xmax ymin ymax])`
- **We can the format of the lines/dots...**
- `xlabel` to add a label to `x` axis.
- `ylabel` to add a label to `y` axis.
- `title` to set a title.



# Reproduce Ballmer peak's plot



CALLED THE BALLMER PEAK, IT WAS DISCOVERED BY MICROSOFT IN THE LATE 80'S. THE CAUSE IS UNKNOWN, BUT SOMEHOW A BAC. BETWEEN 0.129% AND 0.138% CONFERS SUPERHUMAN PROGRAMMING ABILITY.



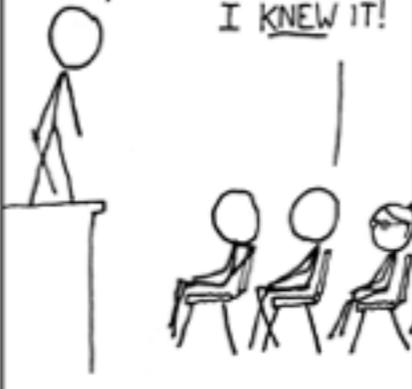
HOWEVER, IT'S A DELICATE EFFECT REQUIRING CAREFUL CALIBRATION—YOU CAN'T JUST GIVE A TEAM OF CODERS A YEAR'S SUPPLY OF WHISKEY AND TELL THEM TO GET CRACKING.



...HAS THAT EVER HAPPENED?

REMEMBER WINDOWS ME?

I KNEW IT!

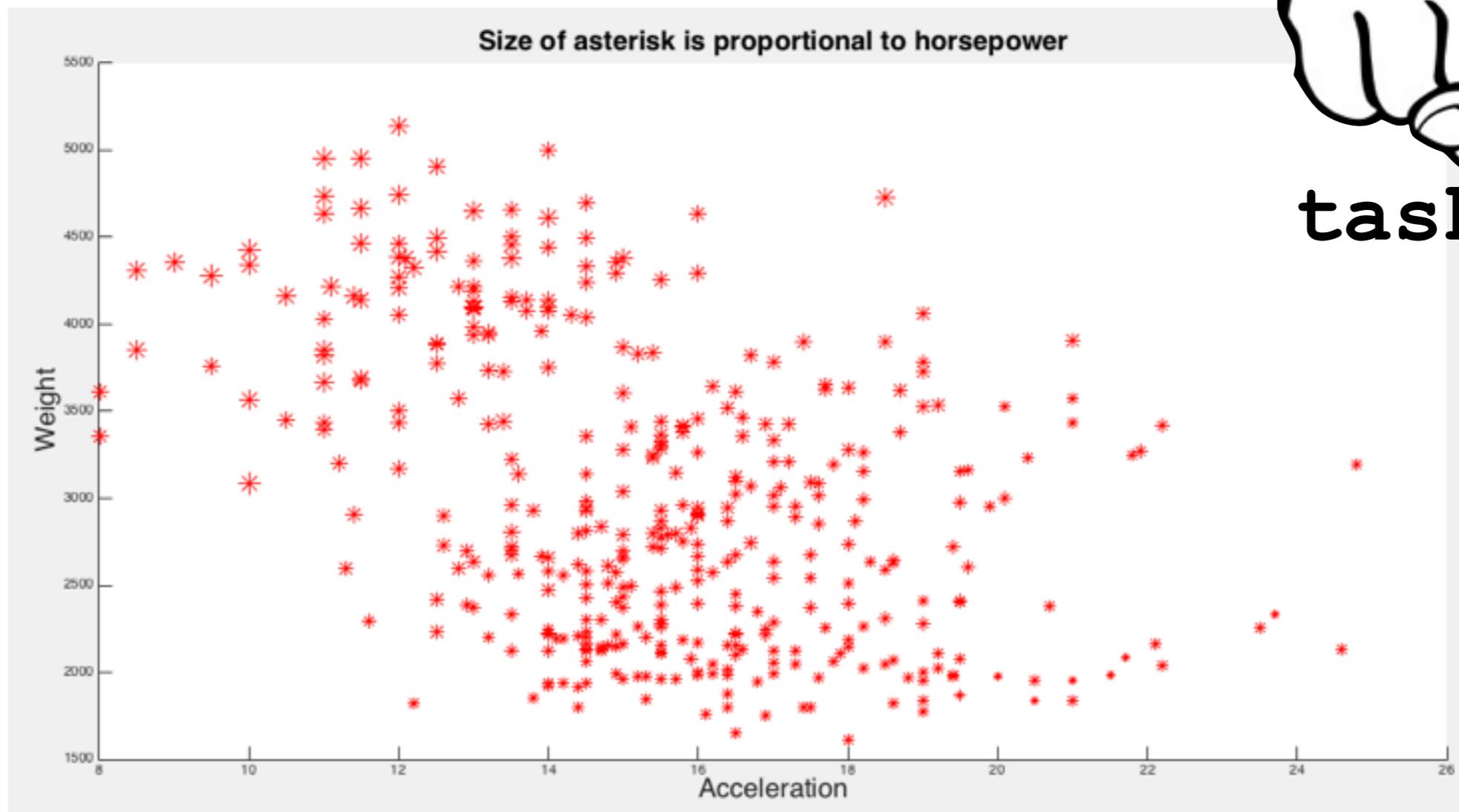


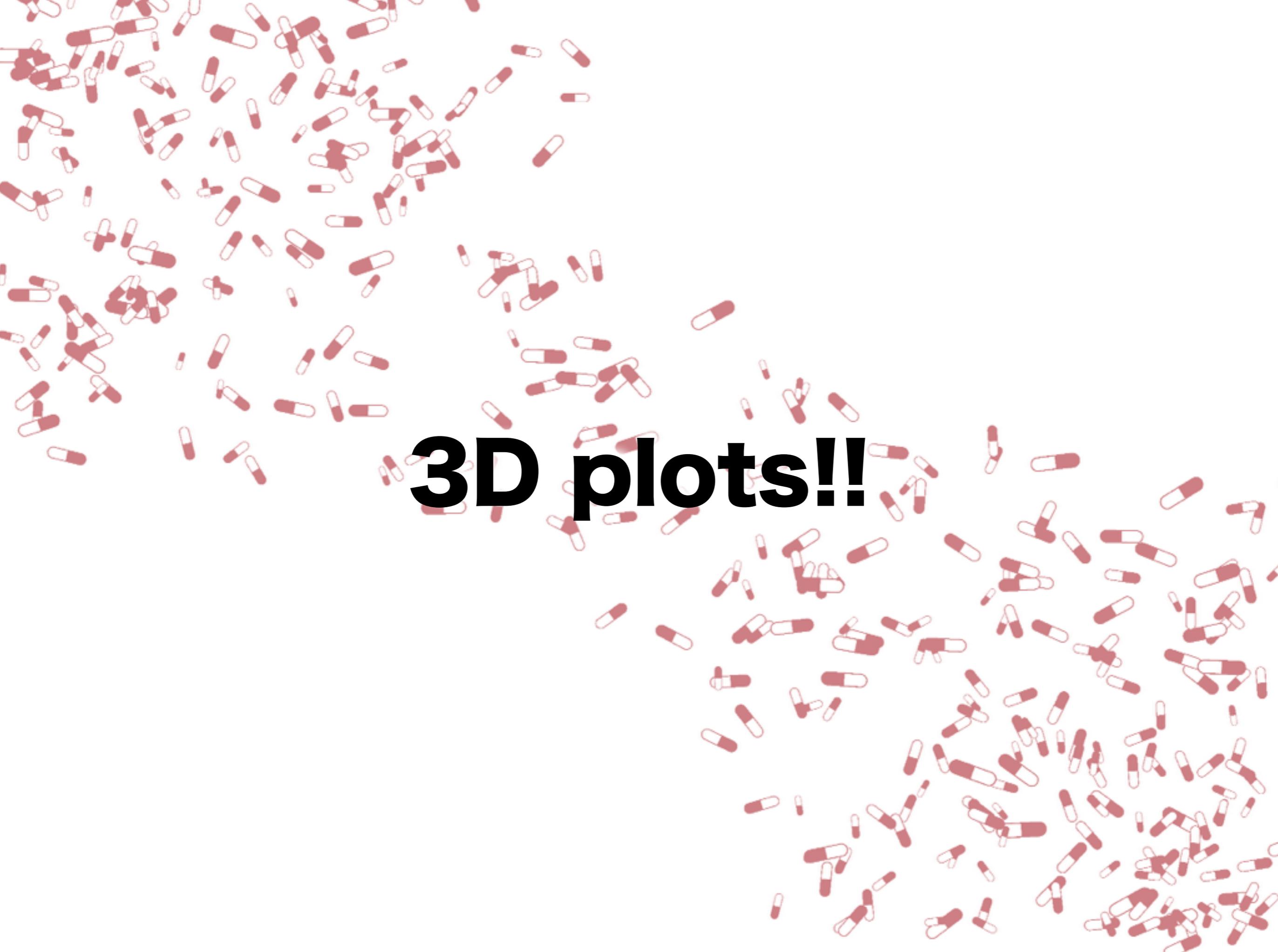
data is in ballmer.mat



# My first scatter plot

- `scatter` is used for scatter/bubble plots.  
`load carbig.mat`  
`help scatter`

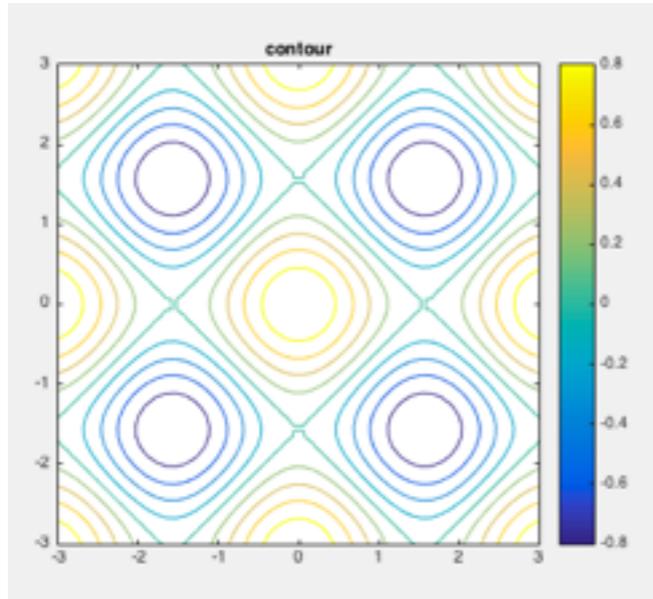


The background of the slide is filled with numerous small, stylized capsules. Each capsule is depicted with a white body and a red band, scattered across the entire white background in various orientations and positions.

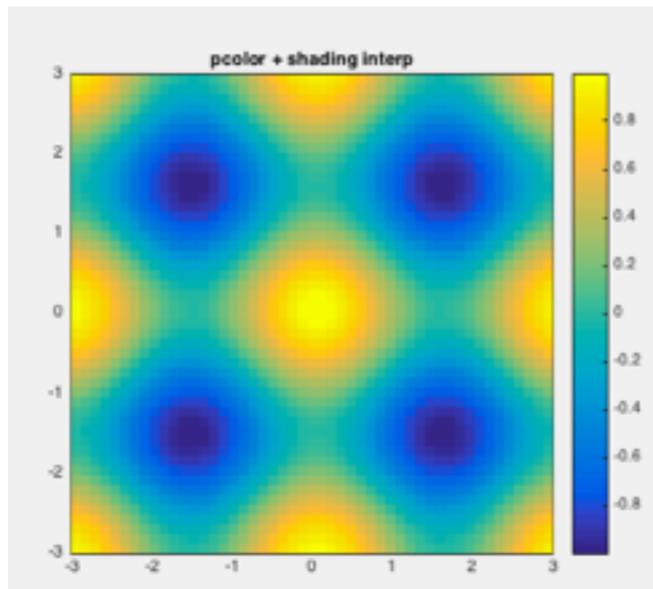
**3D plots!!**

# 3D plots

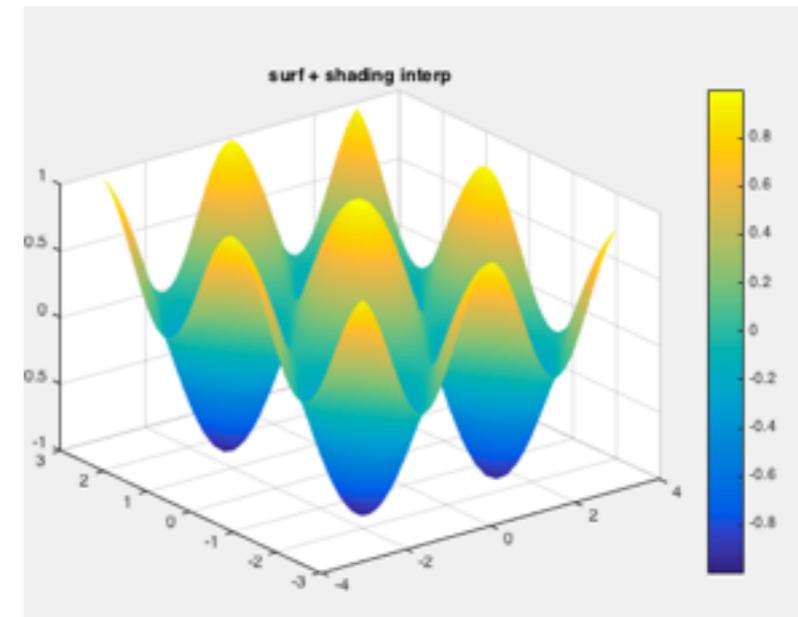
- Contour plots



- Pseudocolor plot



- Surface plots



# Meshgrid for 3D plots

- To make 3D plots we need a meshgrid, a cartesian grid created from vectors:  
 $[x \ y] = \text{meshgrid}(x\_v, y\_v)$
- We use  $x$  and  $y$  to create functions to plot

```
>> x_line = 1:5
```

```
x_line =
```

```
    1    2    3    4    5
```

```
>> y_line = -2:2
```

```
y_line =
```

```
   -2   -1    0    1    2
```

```
>> [x y] = meshgrid(x_line, y_line)
```

```
x =
```

```
    1    2    3    4    5
    1    2    3    4    5
    1    2    3    4    5
    1    2    3    4    5
    1    2    3    4    5
```

```
y =
```

```
   -2   -2   -2   -2   -2
   -1   -1   -1   -1   -1
    0    0    0    0    0
    1    1    1    1    1
    2    2    2    2    2
```

```
>> z = x .* y
```

```
z =
```

```
   -2   -4   -6   -8  -10
   -1   -2   -3   -4   -5
    0    0    0    0    0
    1    2    3    4    5
    2    4    6    8   10
```



# Contour plots

- **Contour of  $z(x,y)$ :** `contour(x, y, z)`
- `colorbar` **to show colorbar**
- **change colors!** `colormap` [jet, hot, cool, spring, winter, gray, bone, copper, pink, lines] **or** `colormapeditor`
- `caxis([cmin cmax])`: **colorbar range**



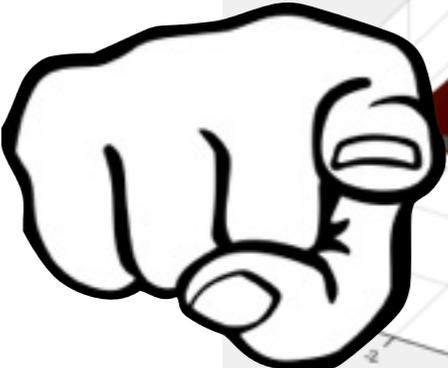
# Pseudocolor plot

- Pseudocolor plot of  $z(x,y)$  works the same  
`pcolor(x, y, z)`
- We can remove the lines by using  
`shading flat`  
`shading interp` (also smoothes)

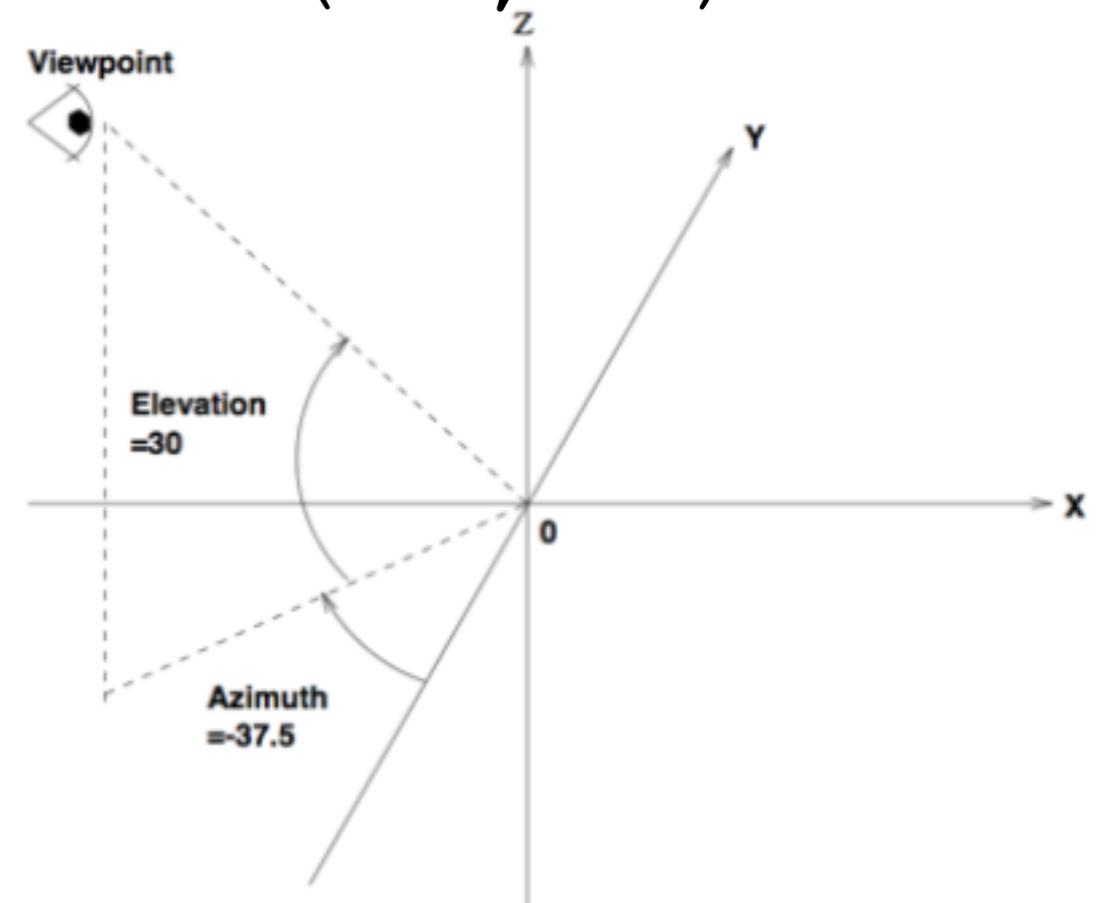
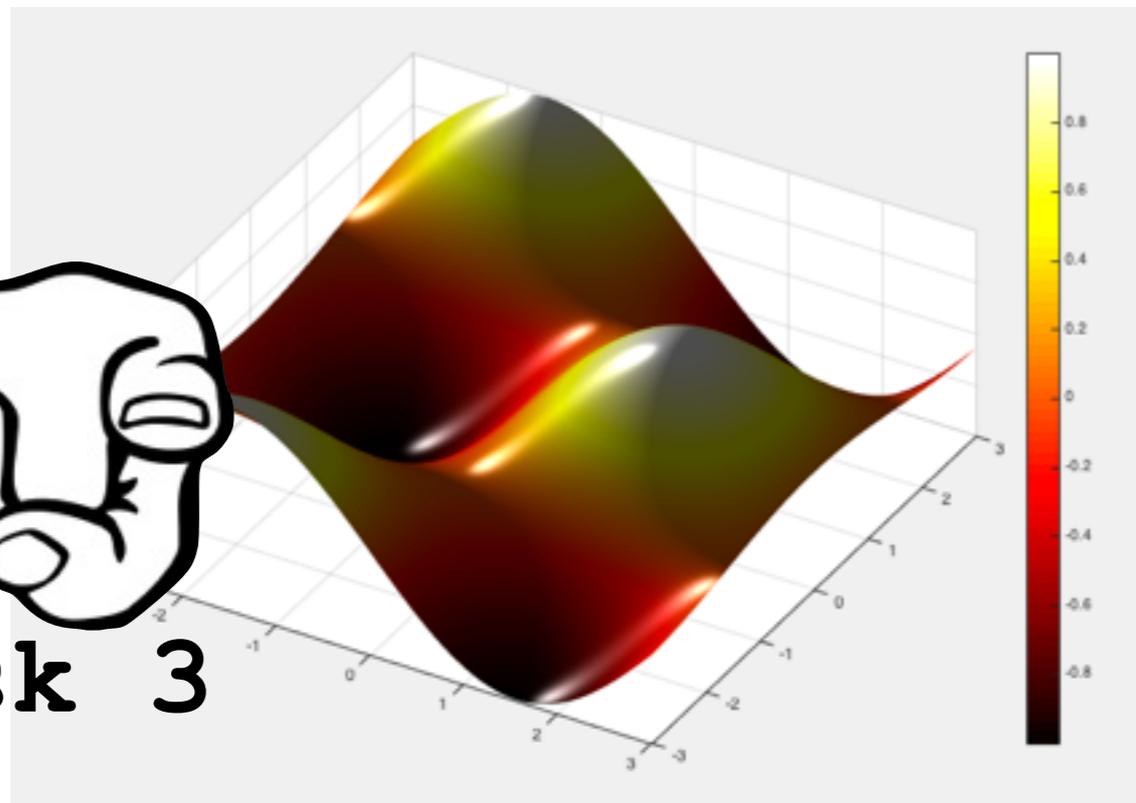


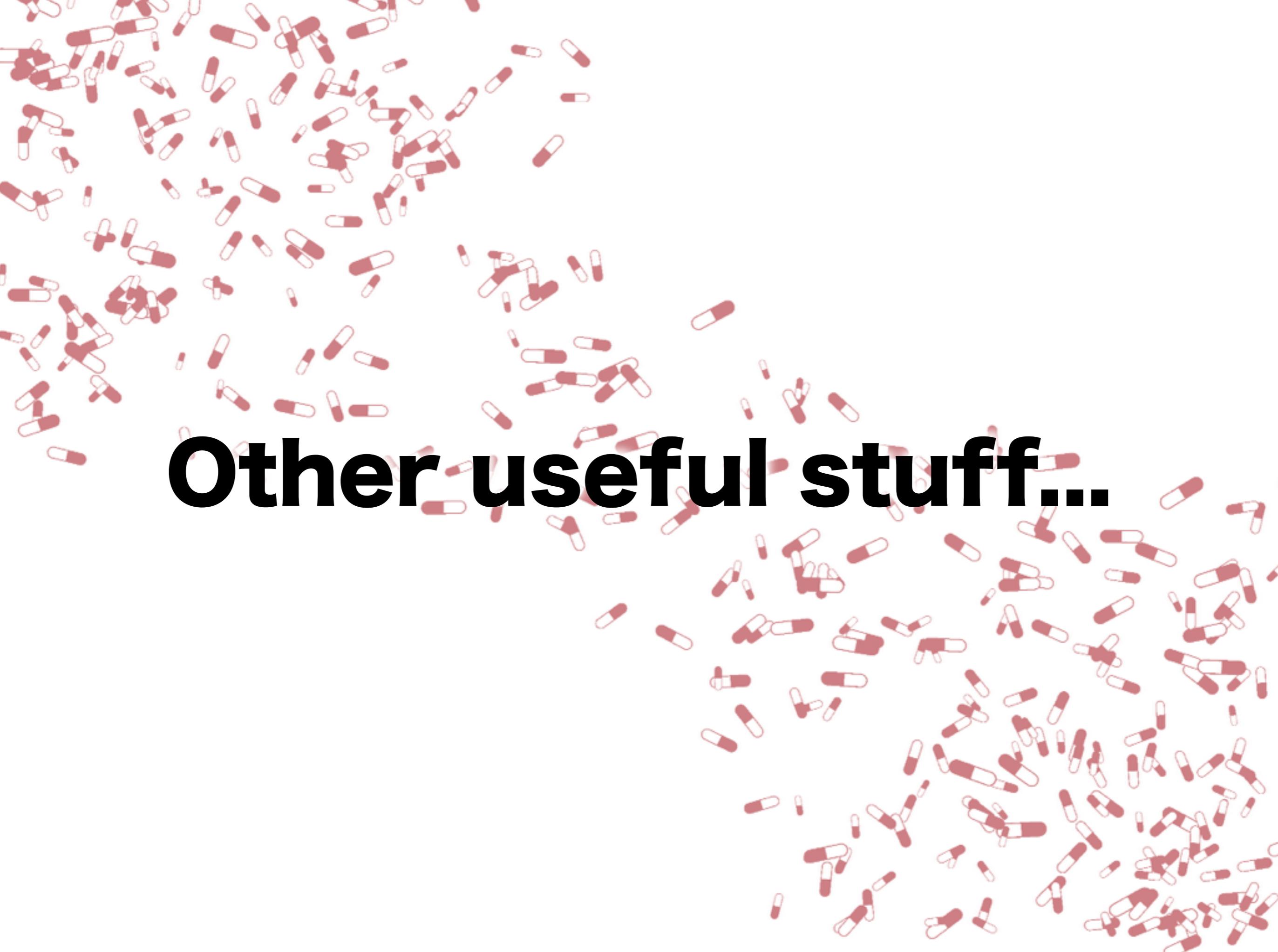
# Surface plots

- They work the same: `surf(x, y, z)`
- Plot  $z = \sin(x)\cos(y)$  in  $[-3 \ 3] \times [-3 \ 3]$
- **Get help!** You can use `lightangle`, `shading`, `lighting`, `view(az, el)`



**task 3**



The background of the slide is filled with a dense, scattered pattern of red and white capsules, resembling a rain of pills. The capsules are oriented in various directions, creating a sense of movement and abundance. The text is centered horizontally and partially overlaid by the pill pattern.

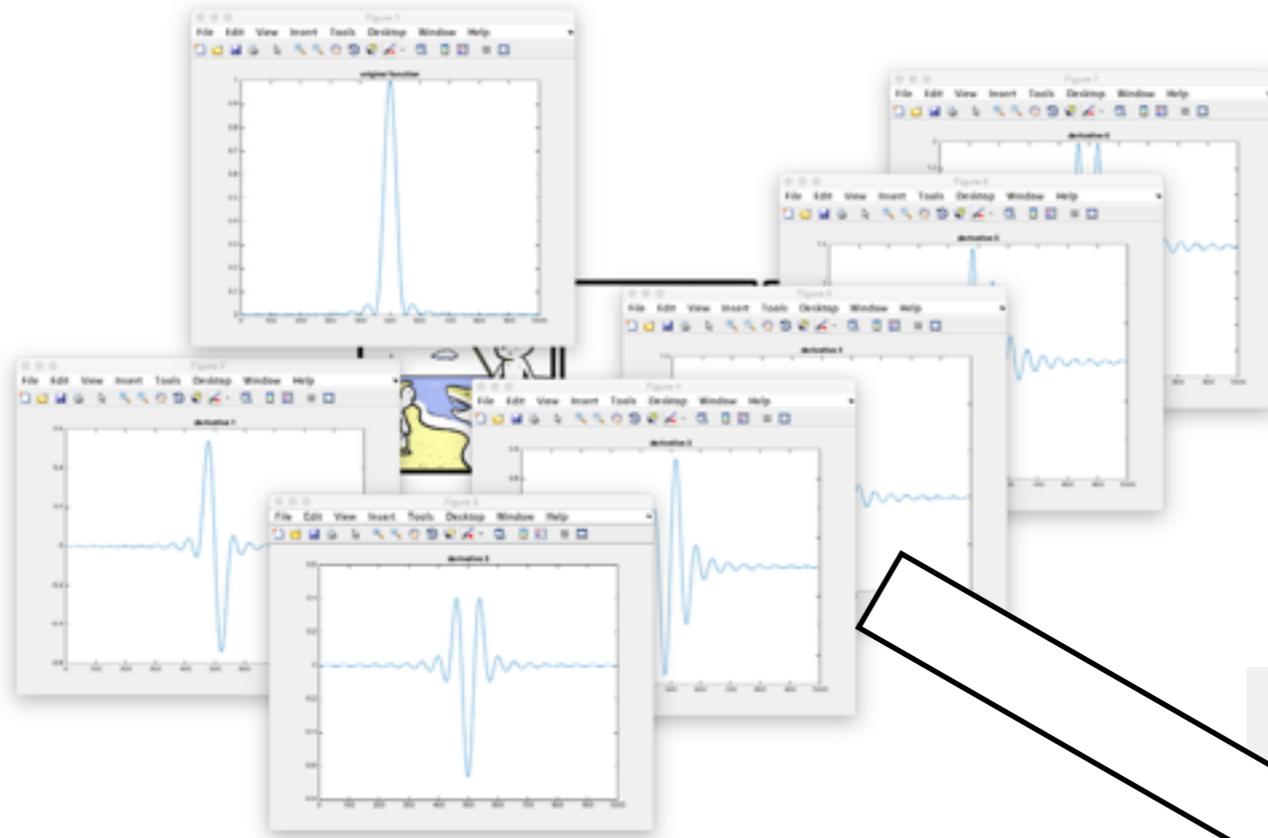
**Other useful stuff...**

# More useful commands

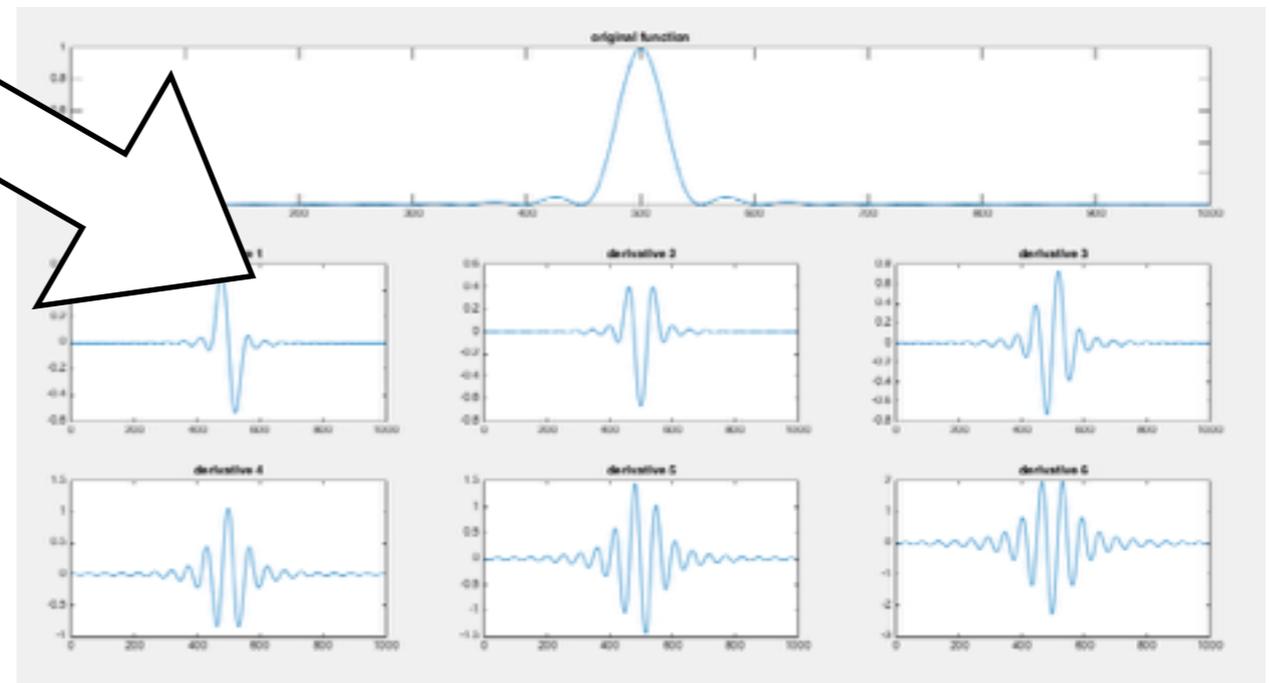
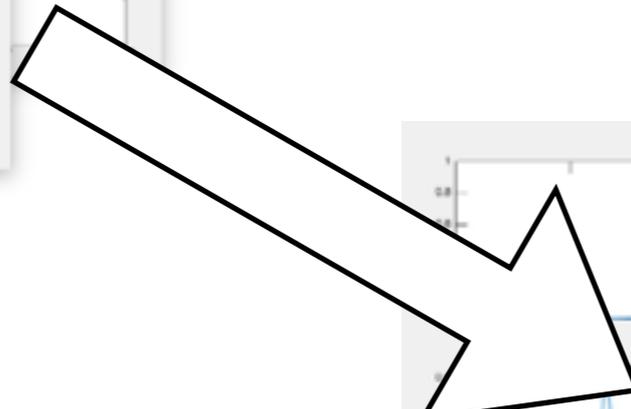
- `figure` makes a new figure.  
`figure(n)` goes to/creates a window for figure `n`.
- `clf` clears the contents of the current figure.  
`clf(n)` clears figure `n`.
- To put multiple plots in the same figure we can use `subplot(nr, nc, i)`.



# Practice your subplotting!



**task 4**



**bonus points for using a for loop!**

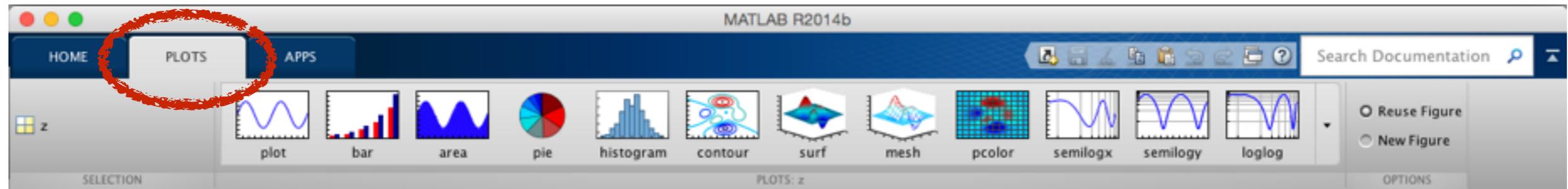


# Exporting your figures

- **Export figure to eps**  
`hgexport (fig_n 'name.eps')`
- **Export to png**  
`print -dpng 'filename.png'`
- **print has lots of options!**  
`help print`



# Don't know which plot to make?

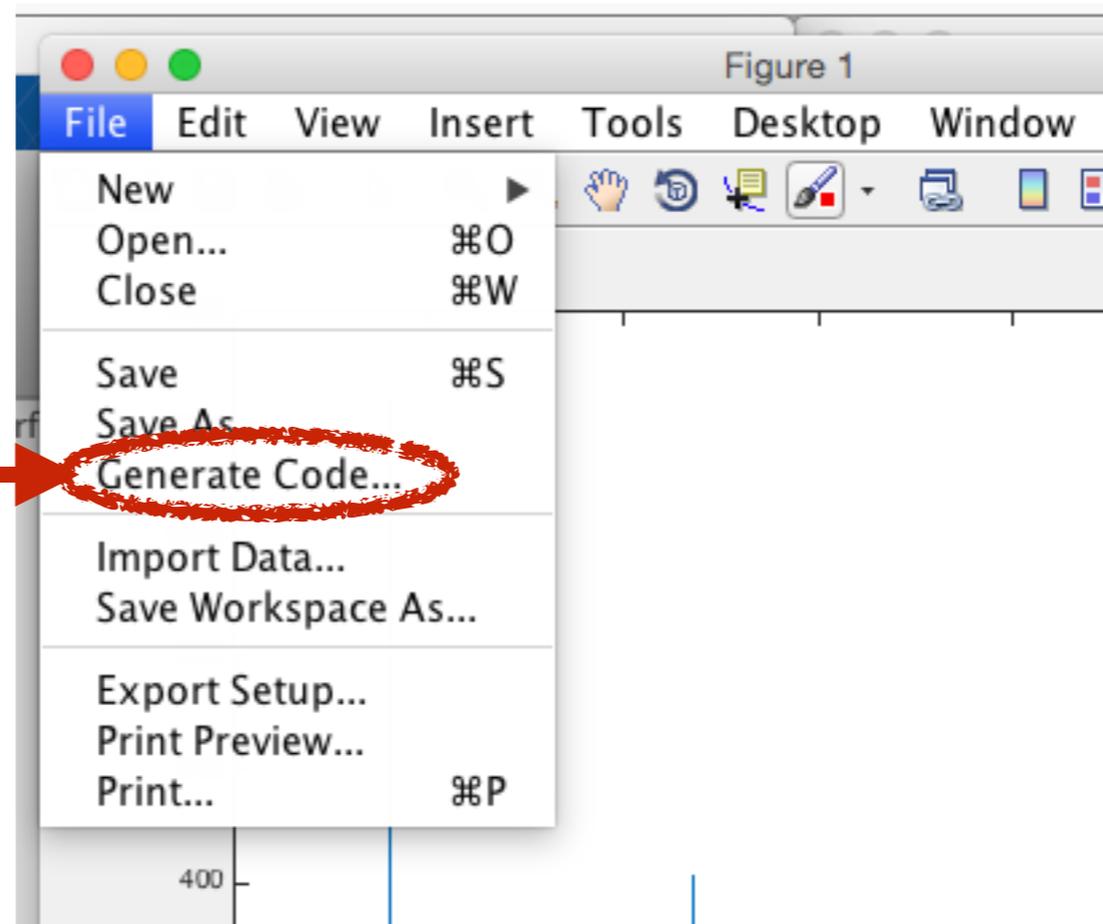


- Select some data on the workspace.
- Click PLOTS.



# Make a function for your plots!

- Once your plot is ready, you can create a function to generate the same plots with different data!



(from the figure menu options)



The background of the slide is filled with numerous small, stylized capsules. Each capsule is white with a red band. They are scattered across the entire frame in various orientations and positions, creating a dense, textured effect.

**Vector plots!!!**

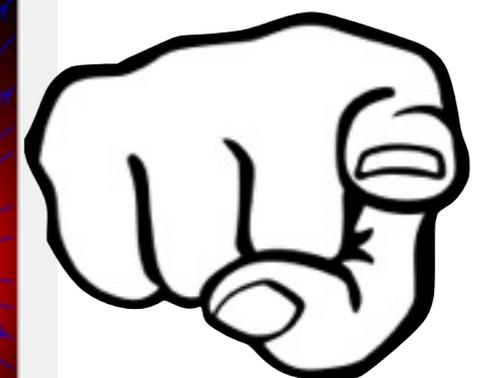
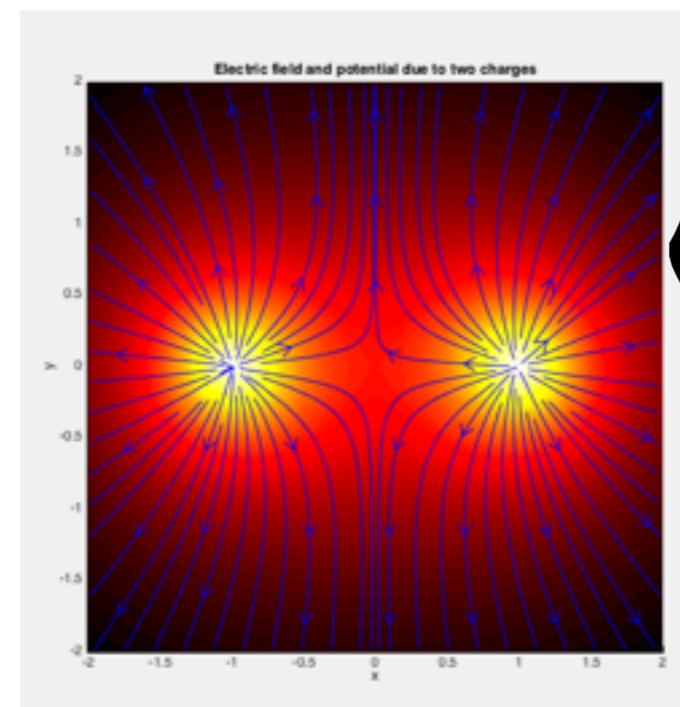
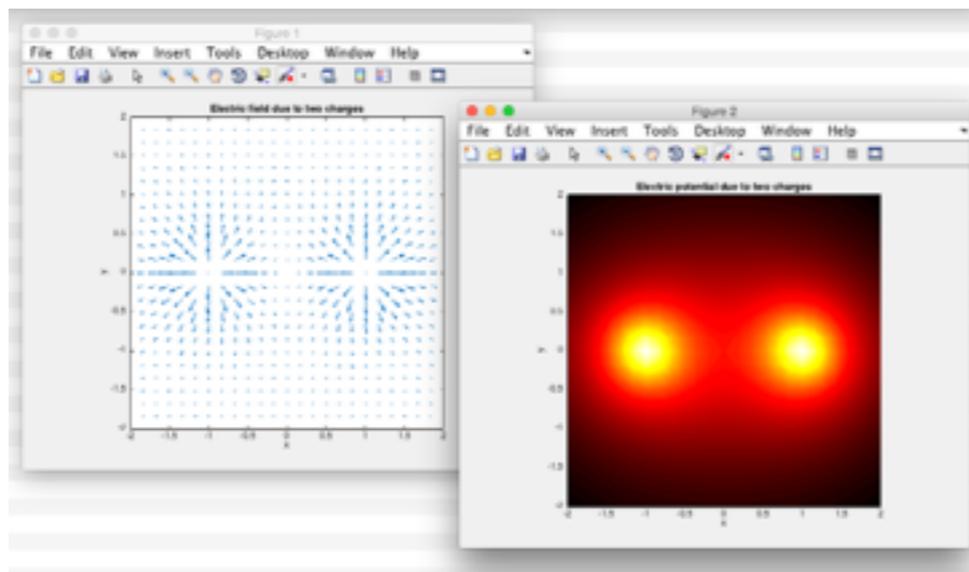
# Vector plots

- `quiver(x, y, vx, vy)` shows vectors starting at  $(x, y)$  of lengths  $(vx, vy)$
- `quiver(x, y, vx, vy, s)` can be used to scale the vector by a factor  $s$ .



# Stream lines of vector field

- `streamslice (x, y, vx, vy)` draws streamlines with the vector field defined by the inputs.
- Create an awesome plot combining both the potential and electric field stream lines.



task 5





**Happy plotting!**