Business…

- **Presentation:**
  - Signup!
    - Email goes out this afternoon with a link!
- **Submit manuscript** on or before the last day of exams
- **Abstract** returned with comments today
- **Figure and caption**…

SNOW DAY!

Figure and caption assignment

- Figure and caption assignment:
  - Prepare pdf figure
  - Prepare caption using text or word.
  - Submit both on canvas

Paul's tips for plots

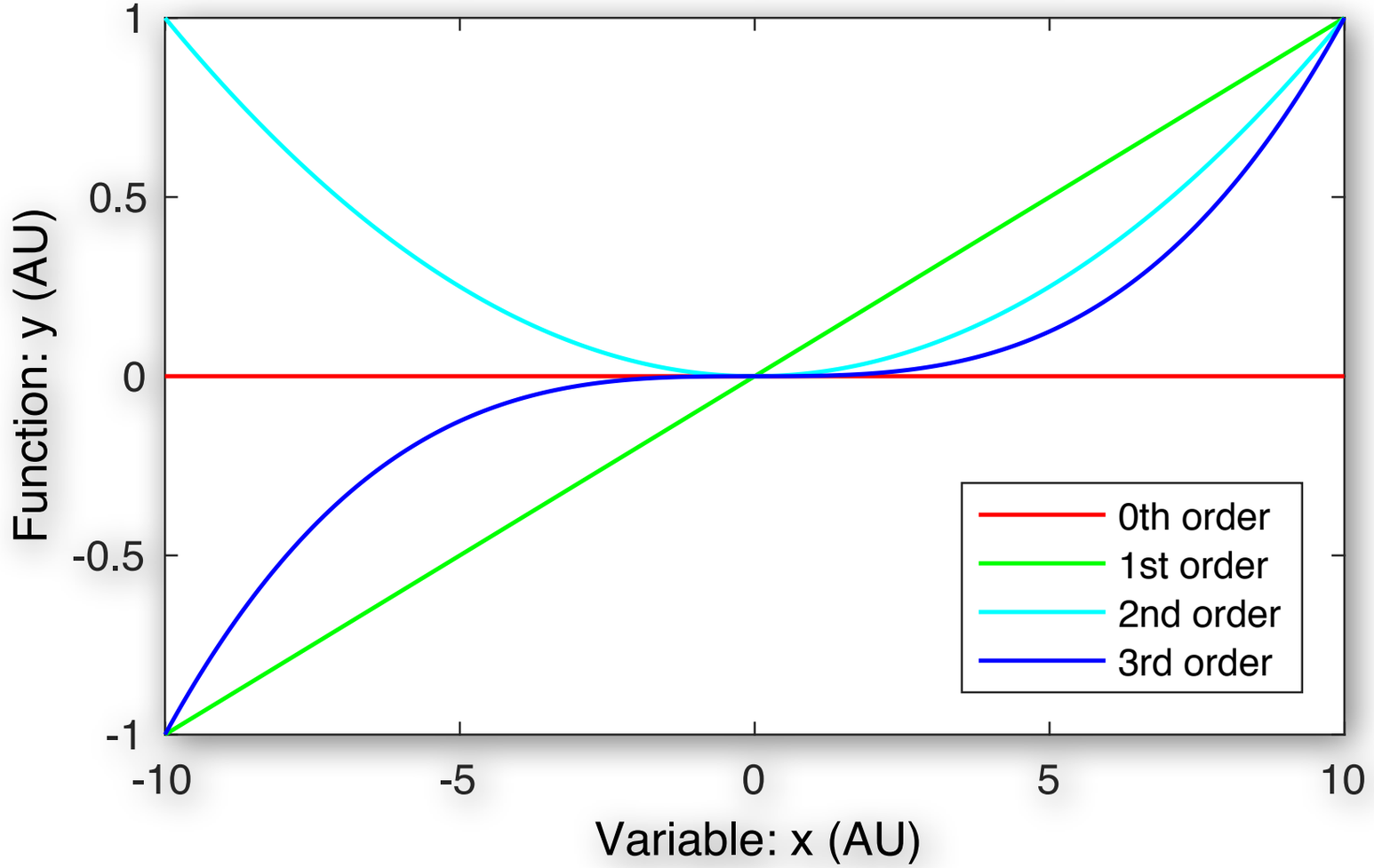
Physics 495

What I recommend…

- **Make a script** to build each figure from scratch.
  - Save data in files…
  - Code everything you need to make the figure
    - Expect to go through > 5 iterations
- MATLAB: **save as fig** and export format
  - Fig allows you to modify many things
- **Do not use Illustrator** until the figures are close to final.
- **Print** at the correct size and see how it looks on paper
- **Show** your figures to others for feedback
- Some people will **just look at the figures**

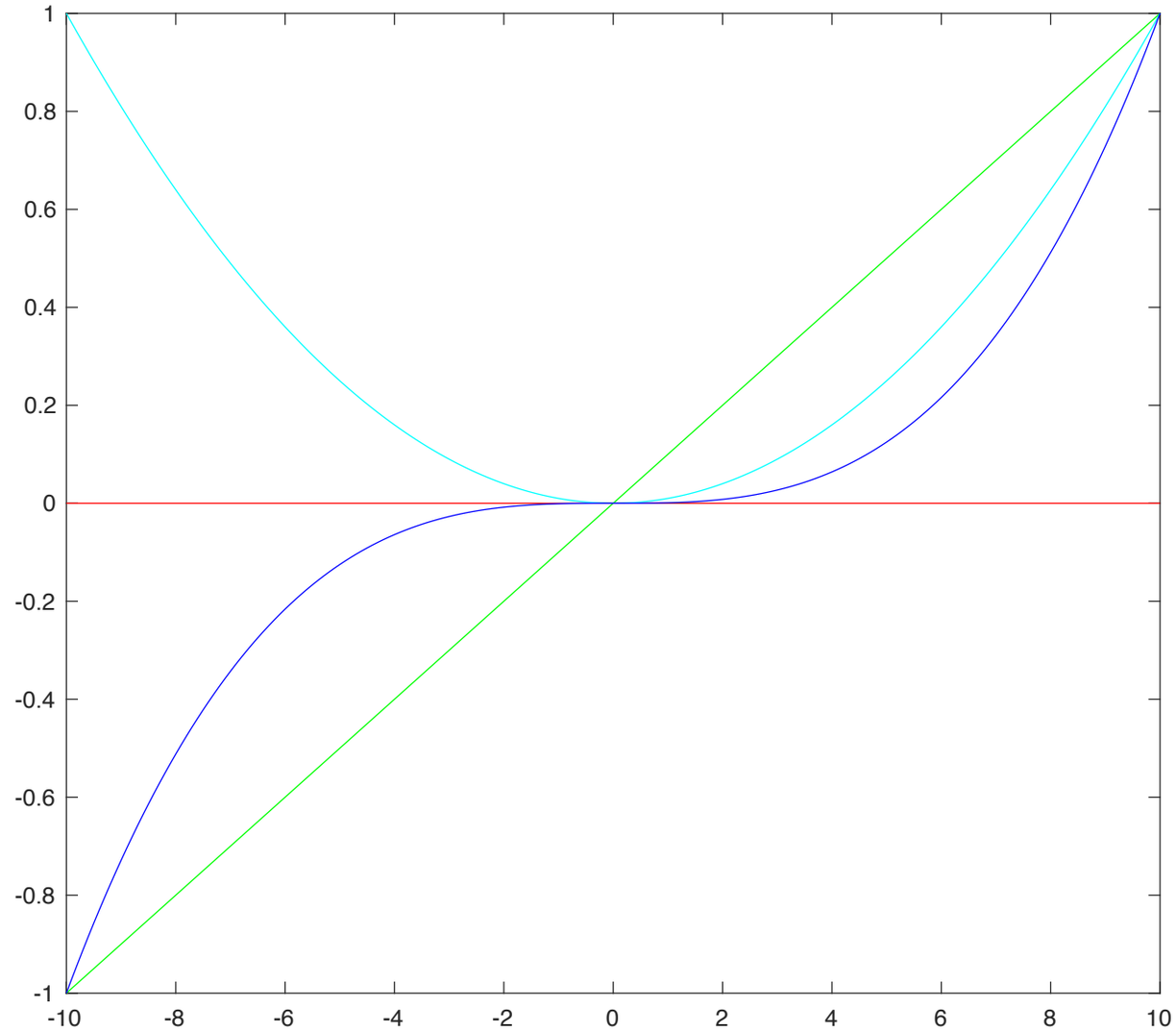
Partial checklist:

- **Vector not raster (pdf, eps, …)**
- **Axis labels**
- **Legend**
- **Right Size**



1: Studying polynomials!

What is this?

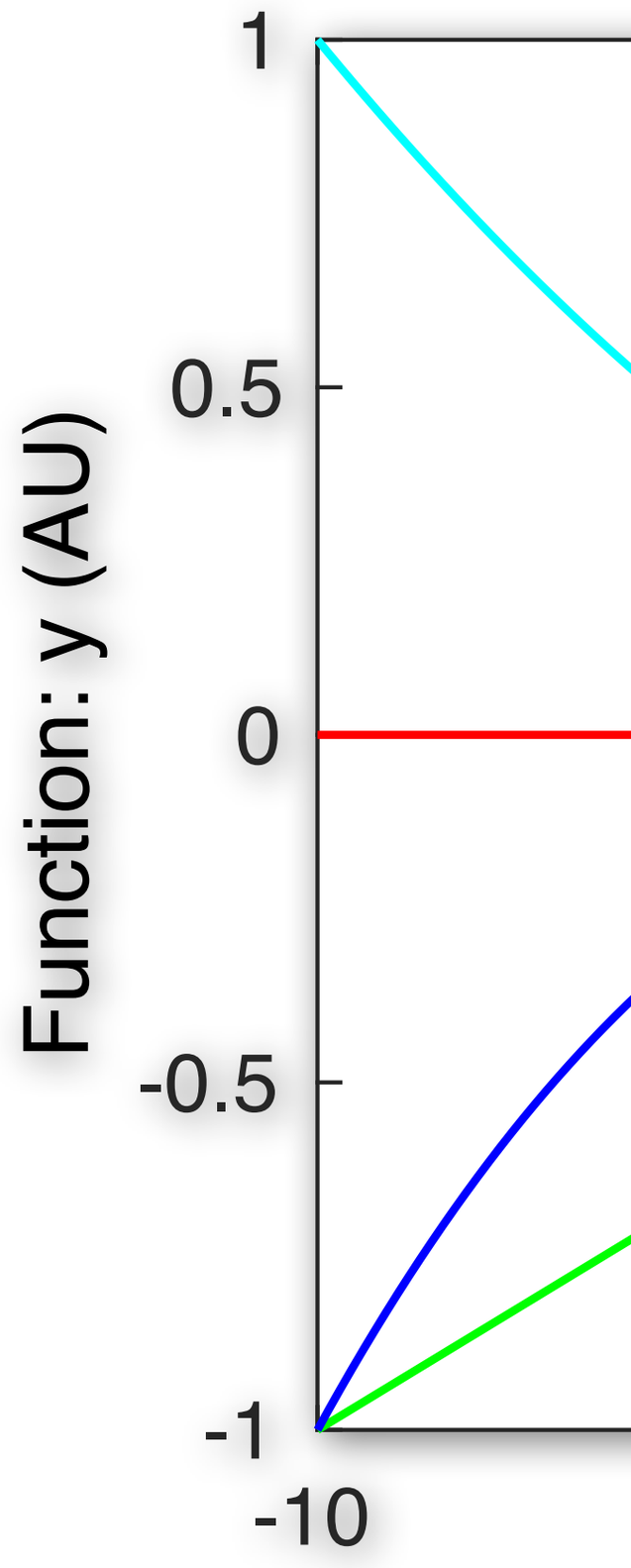


- Problem: No labels or legend!

Labeling axes:

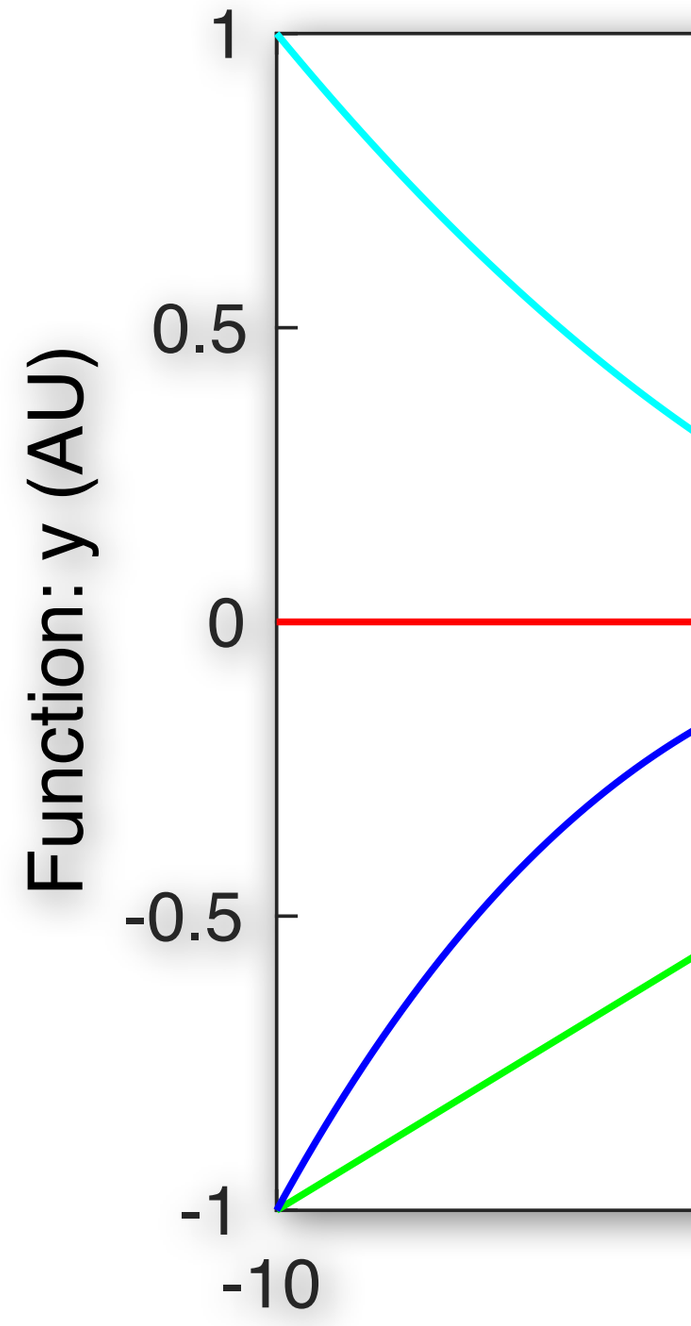
My own style:

- `Name: Symbol (Units)`
- Why name: people read only the figures
- Why Symbol: Be precise.
- Units: _ if unit-less, AU if arbitrary

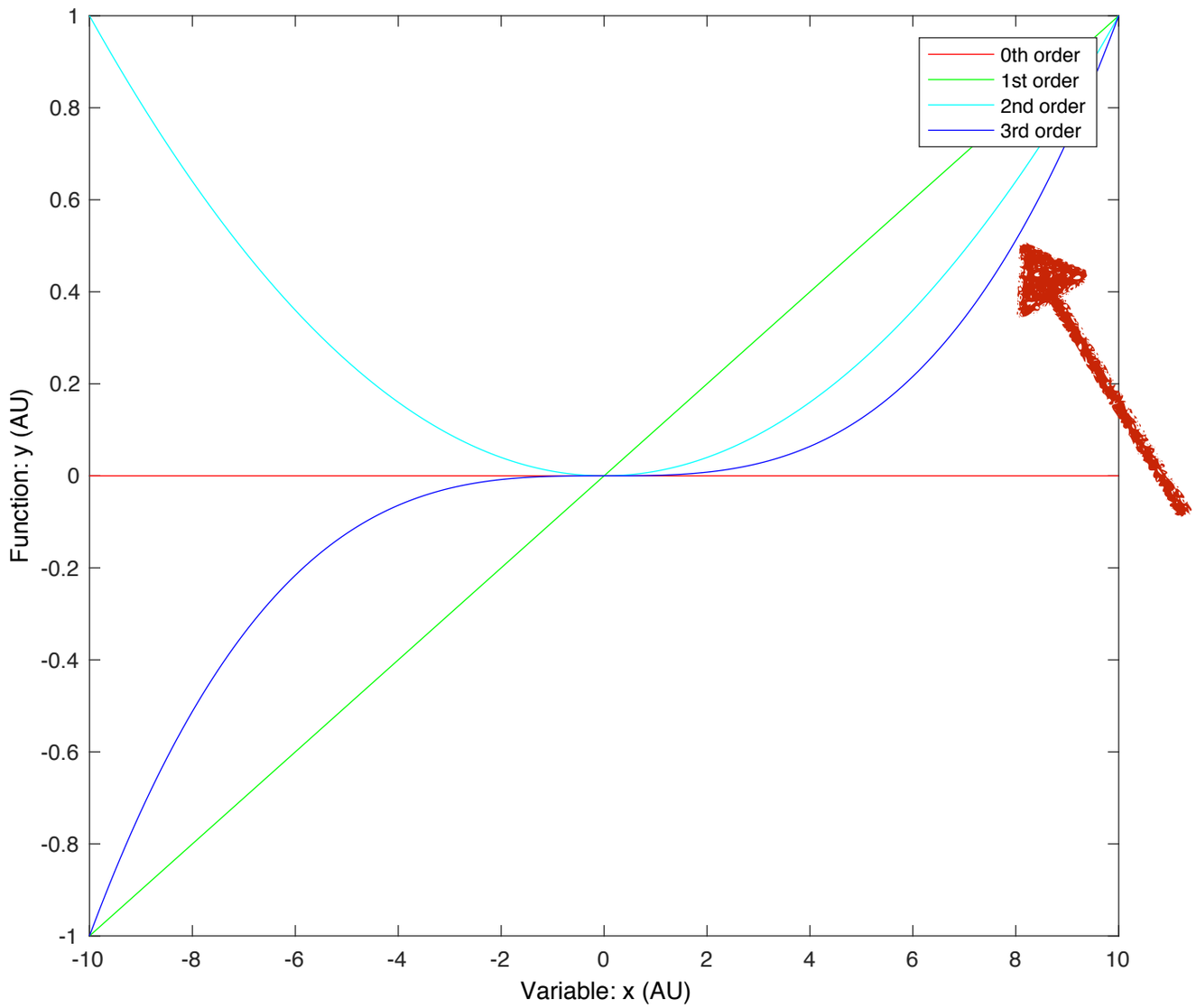


Include 0 or plot ΔΔG

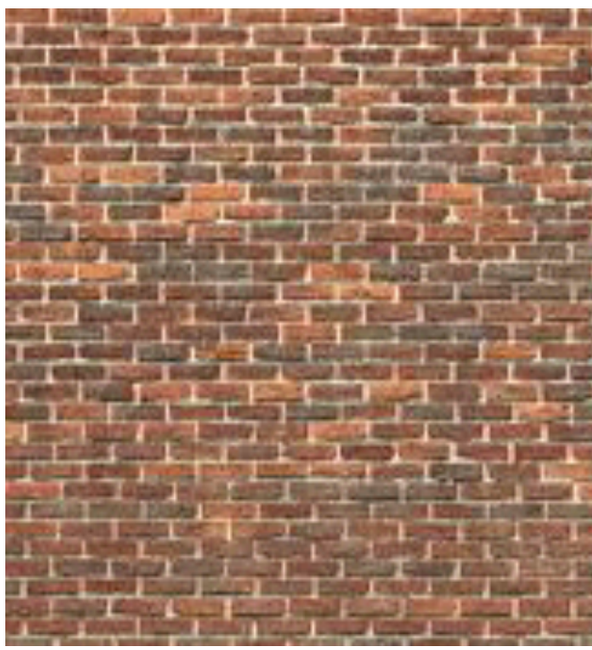
- People will intuitively assume that 0 is on the plot
- Won't understand variation if 0 isn't included
- If no 0, have a good reason…
- For instance:
  - Problem: Plot by year (t = 1990,1991…)
  - Solution: Plot by year relative to start… (Δt = 0,1…)



2: Studying polynomials!



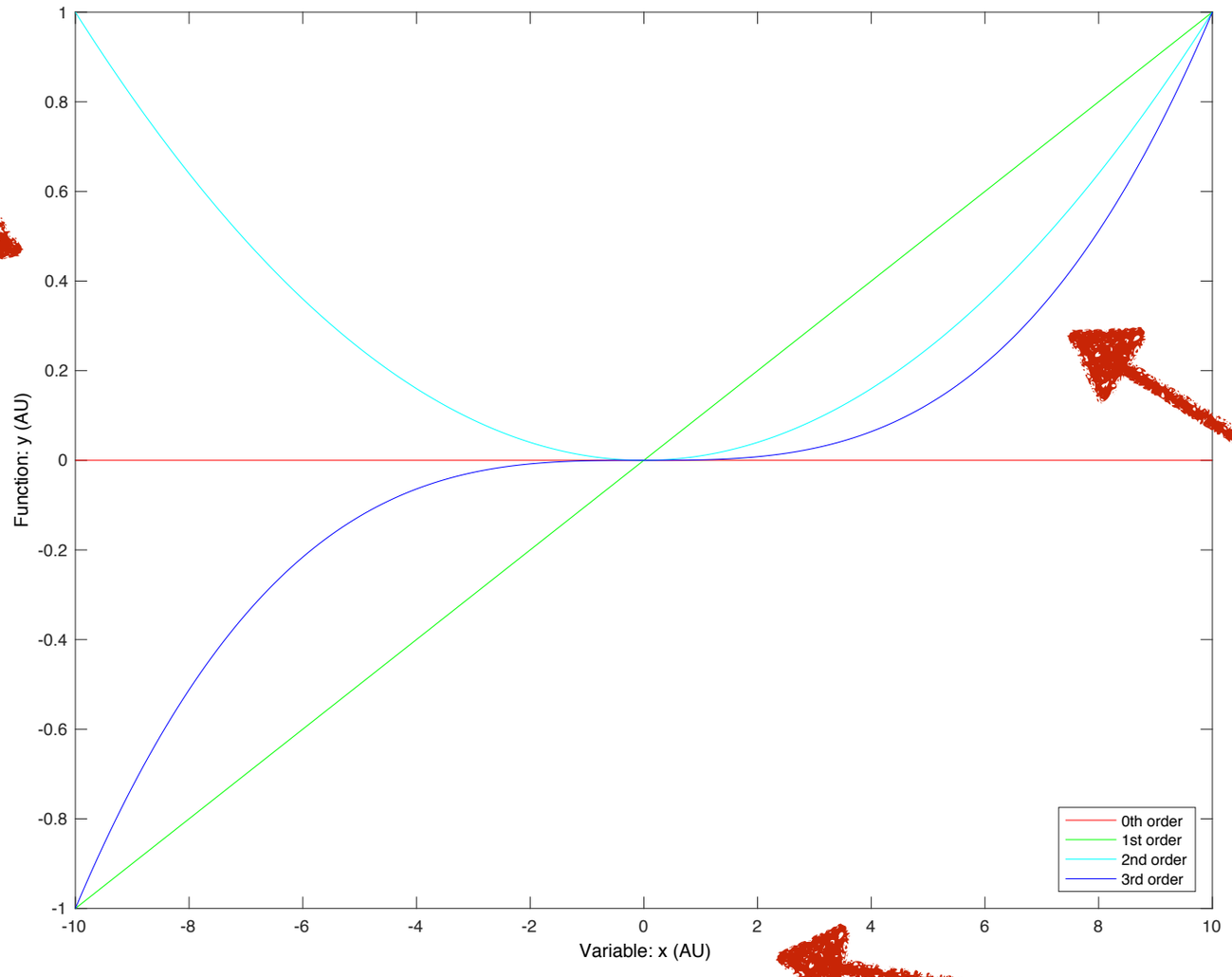
Cant see!



- Problem: Legend overlaps lines!

3: Studying polynomials!

Too many ticks

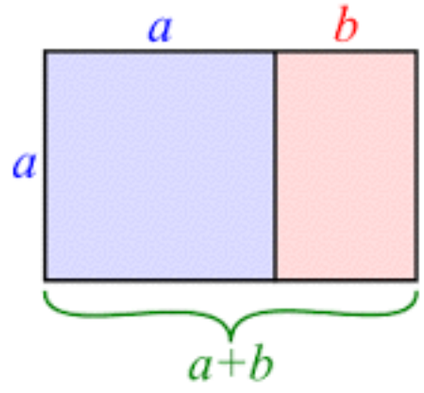


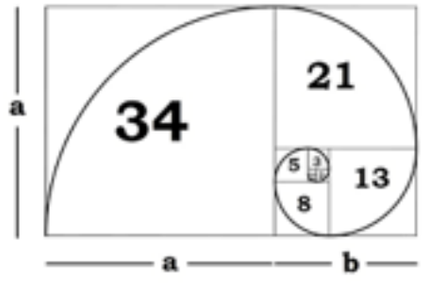
Line weight too small

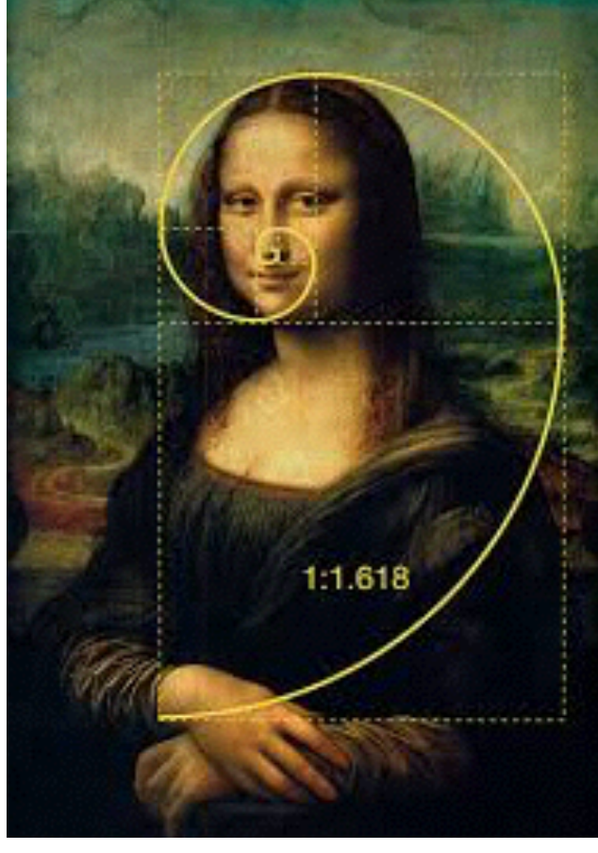
Can't see!

- Problem: Plot size!

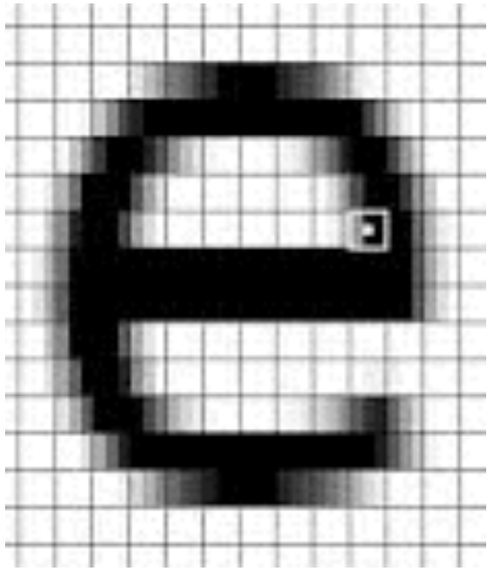
Right size:



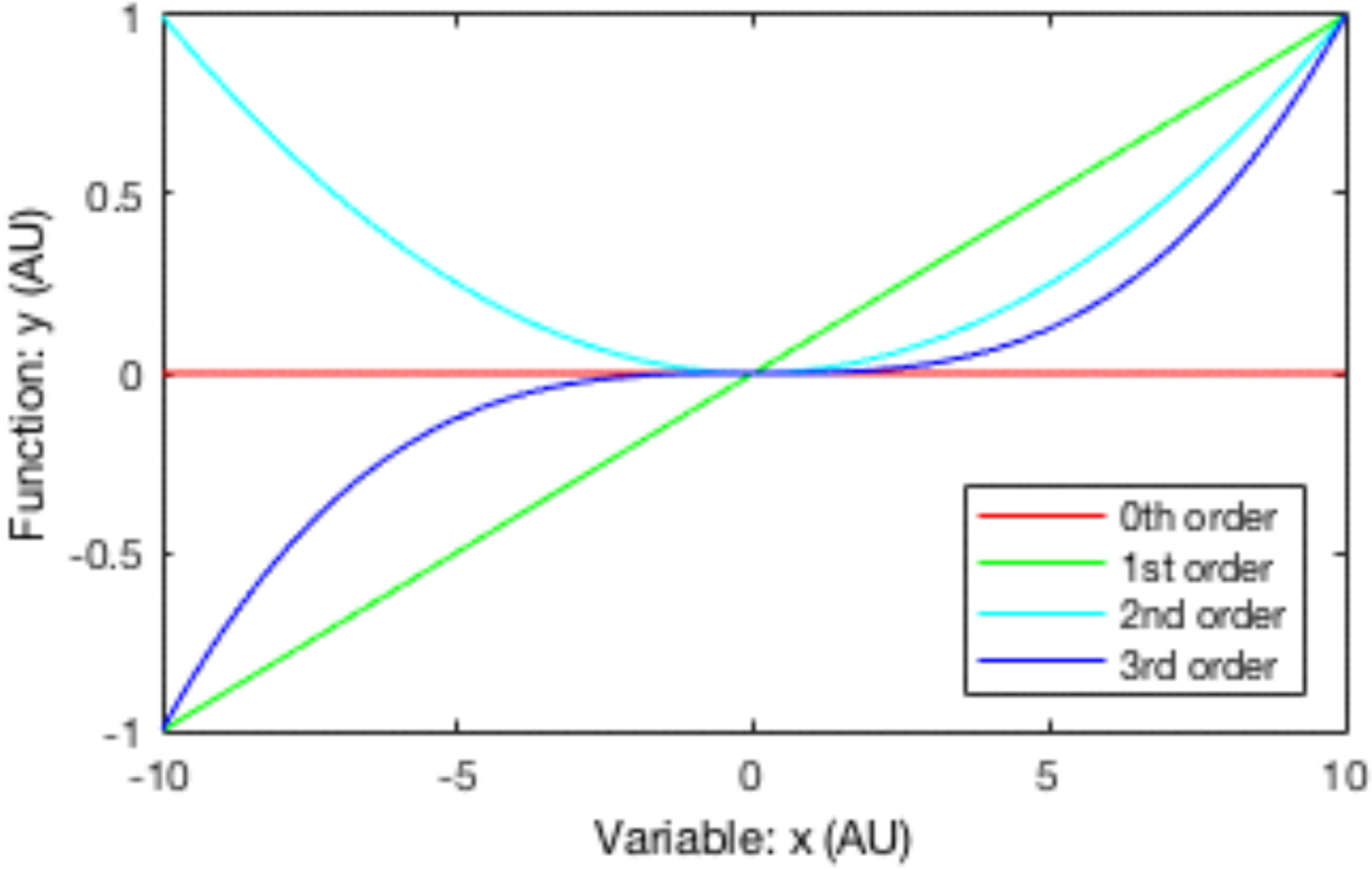




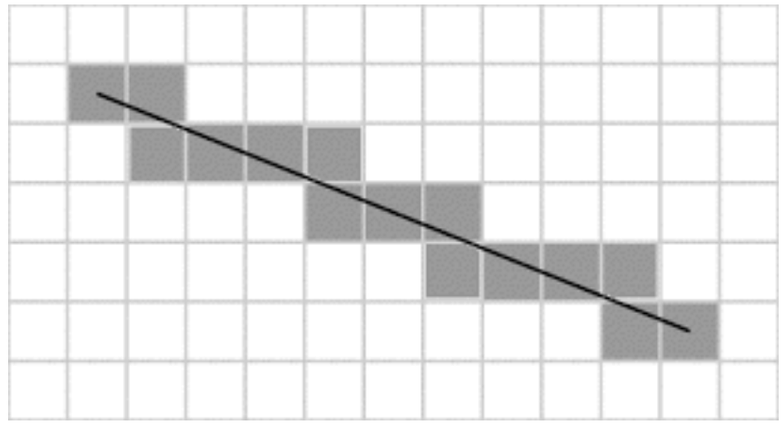
- Golden ratio: Use: 5 in x 3 in
- Font size: Use 10-12 pt, 8 pt for exponents
- Line weight (width): Use 0.5-1 pt
- Number of ticks: 3-10
- Legend: Good size, no overlap, clean



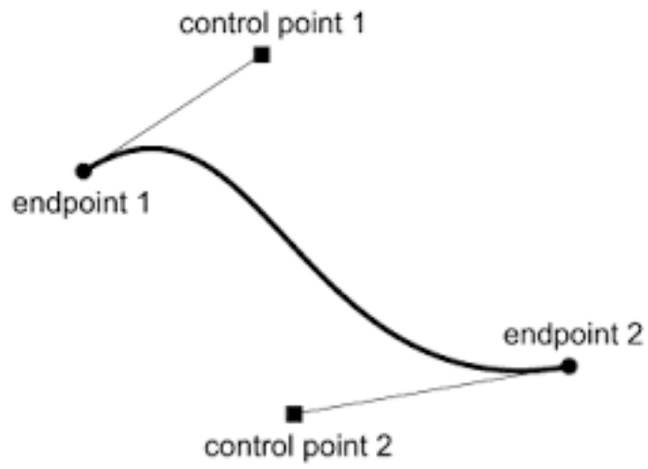
4: Studying polynomials!



Raster: tif, bmp, jpeg



Vector: pdf, eps, …



- Problem: Raster versus vector

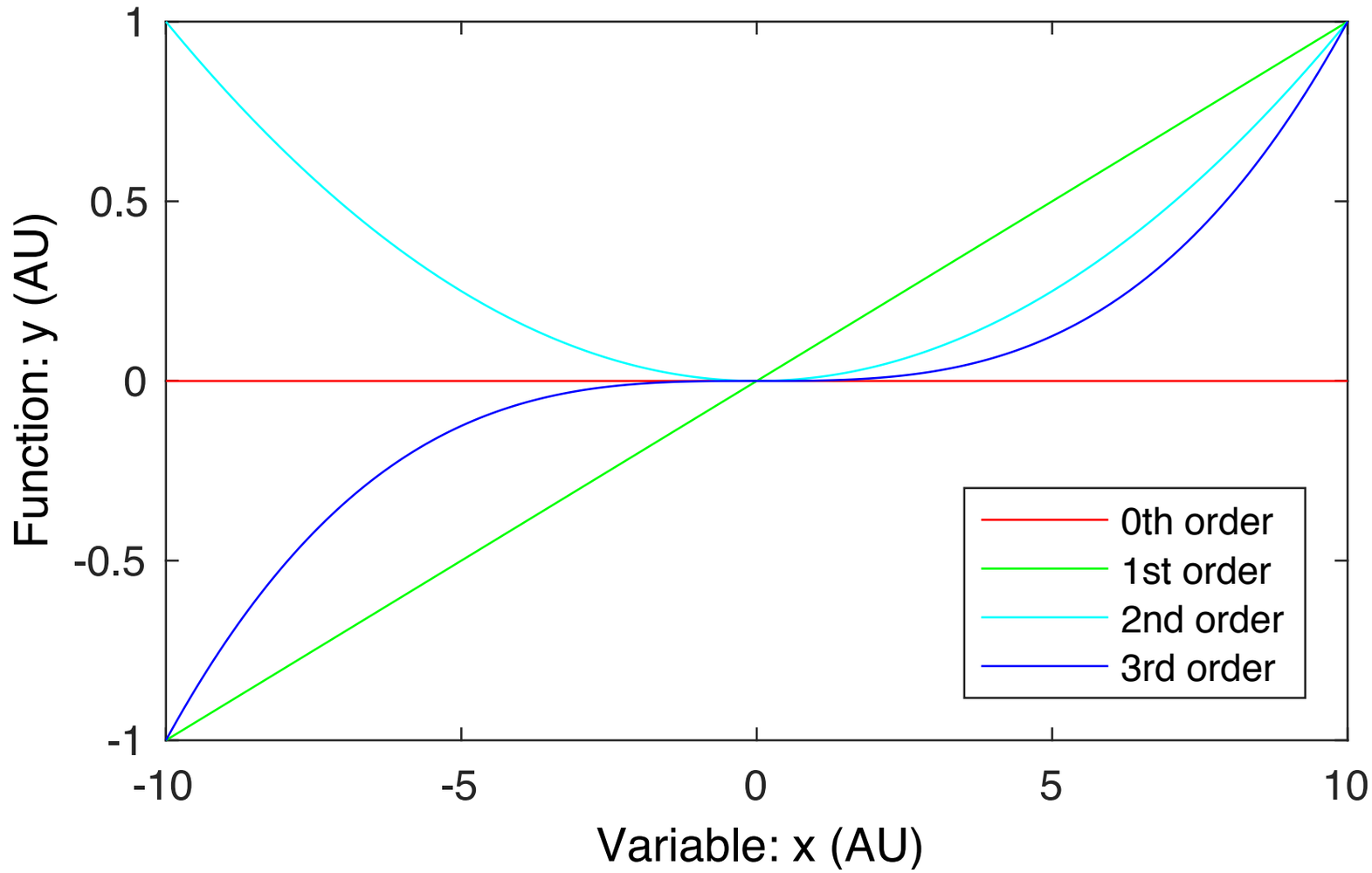
Bézier curves

Lossy, lossless, pixel depth

Tiff | Jpg

16.7 Million Colors | 256 Colors | 16 Colors

5: Studying polynomials!



- Great start!

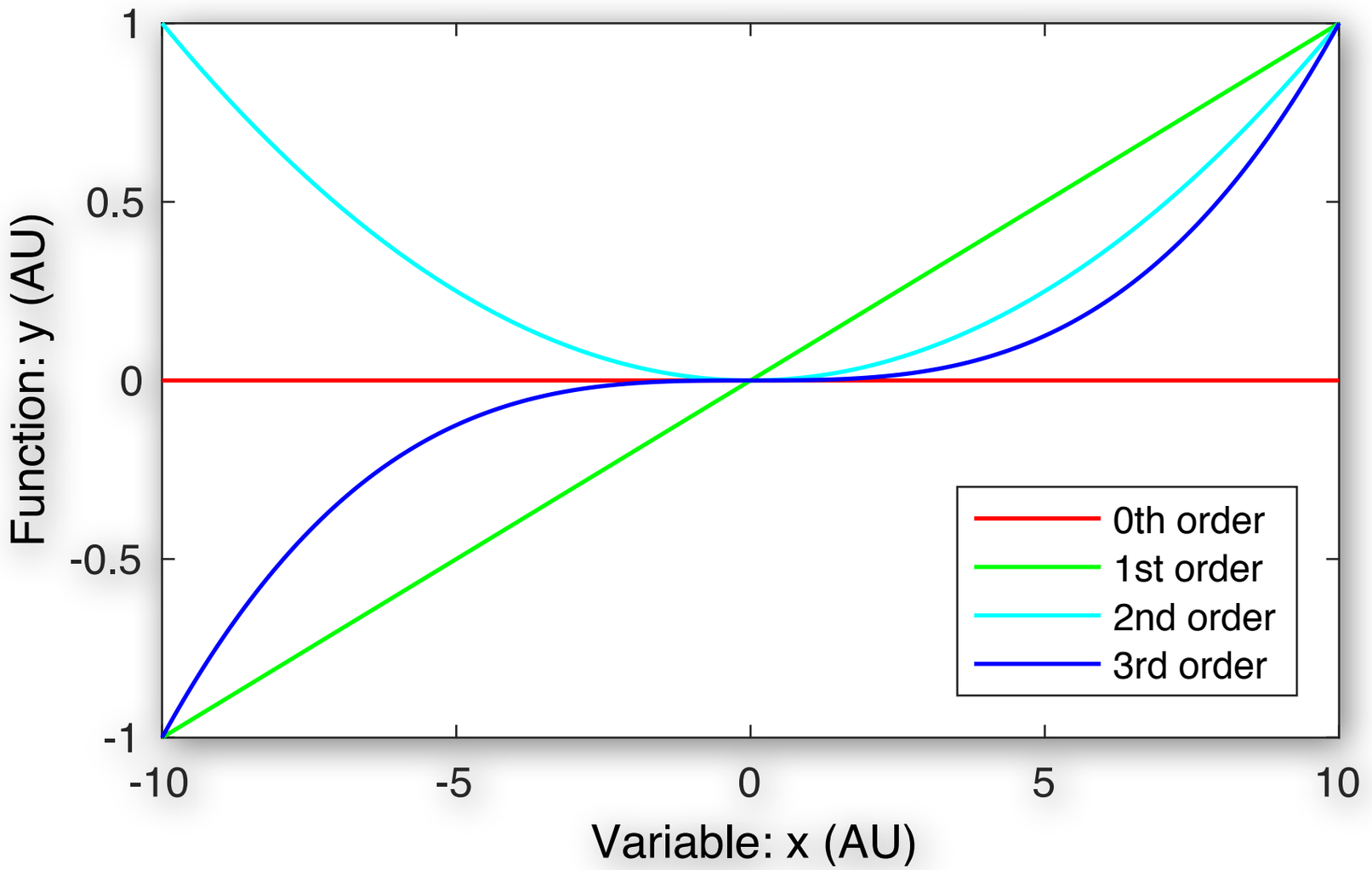
My code in MATLAB

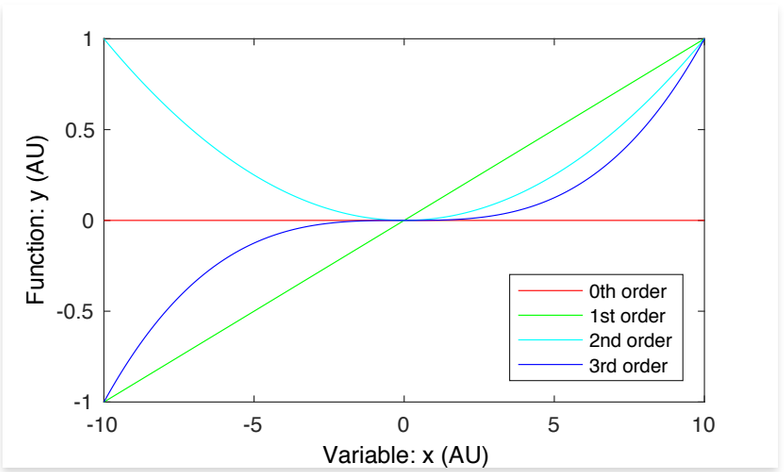
```
close all;

figure(1);
clf;


x = -10:.1:10;
y0 = 0*x.^0;
y1 = x.^1/10;
y2 = x.^2/100;
y3 = x.^3/1000;

plot( x, y0, 'r' );
hold on;
plot( x, y1, 'g' );
plot( x, y2, 'c' );
plot( x, y3, 'b' );

% print first figure
print -dpdf ~/Desktop/print1.pdf

% Add labels and legend
ylabel( 'Function: y (AU)');
xlabel( 'Variable: x (AU)');
legend( {'0th order','1st order','2nd
order','3rd order'})

print -dpdf ~/Desktop/print2.pdf

% Put legend in the right place
legend( {'0th order','1st order','2nd
order','3rd
order'},'Location','SouthEast')
print -dpdf ~/Desktop/print3.pdf

doPageFormat( [5,3] );

% raster
print -dtiff -r72 ~/Desktop/print4.tif

% vector
print -dpdf ~/Desktop/print5.pdf
```

doPageFormat.m

```
function doPageFormat( ss, inv_flag )


if ~exist( 'ss') || isempty( ss )
    ss = [5,3];
end

h = gcf;


if exist( 'inv_flag', 'var' ) && inv_flag
    set(h,'InvertHardcopy', 'off' );
end

set(h,'PaperPosition',[0, 0, ss]);
set(h,'PaperSize',[ss]);

end
```

6: Studying polynomials!

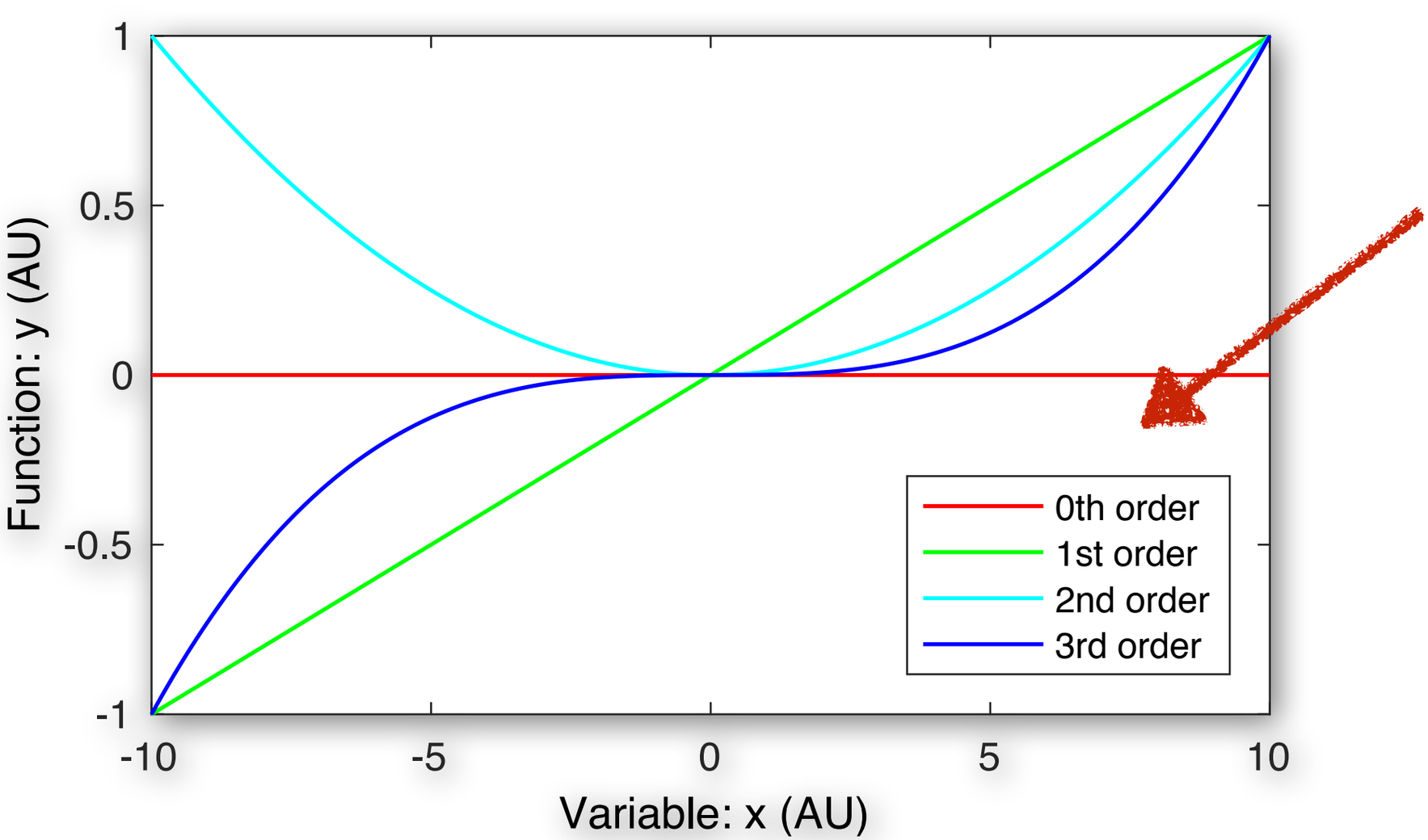




Get rid of the box
Fine-tune weight

- Fine-tuned in Adobe Illustrator (or Inkscape)

7: Studying polynomials!

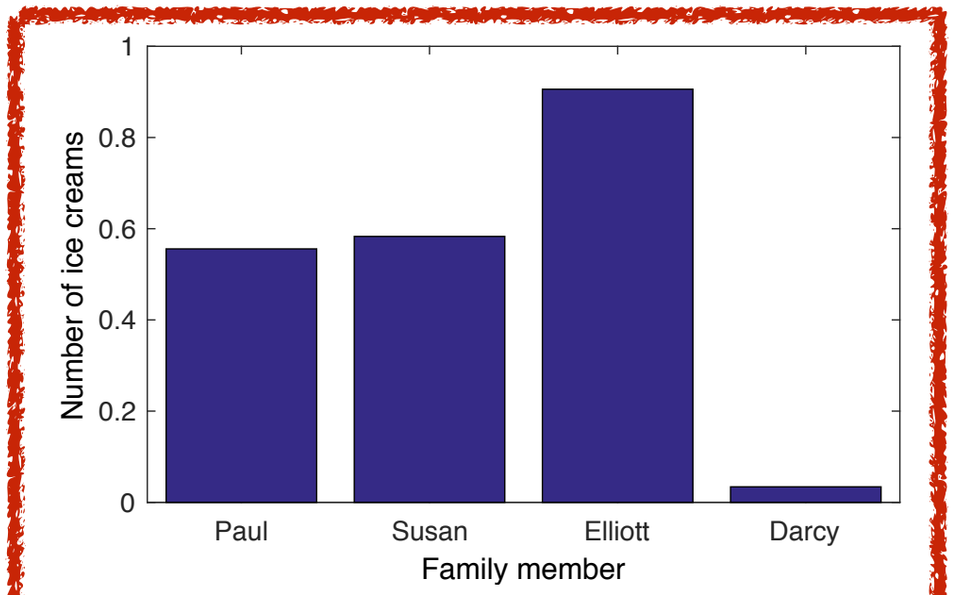


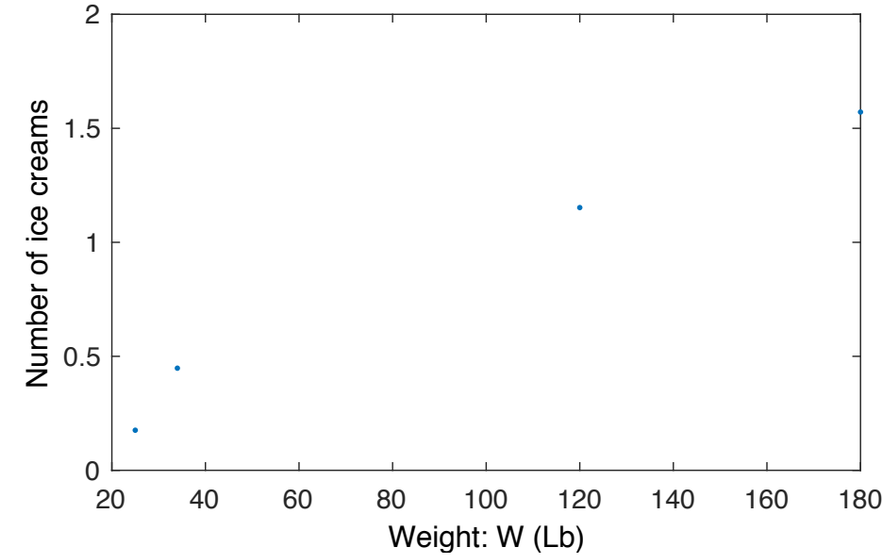
- Add other annotation elements to help in talks…

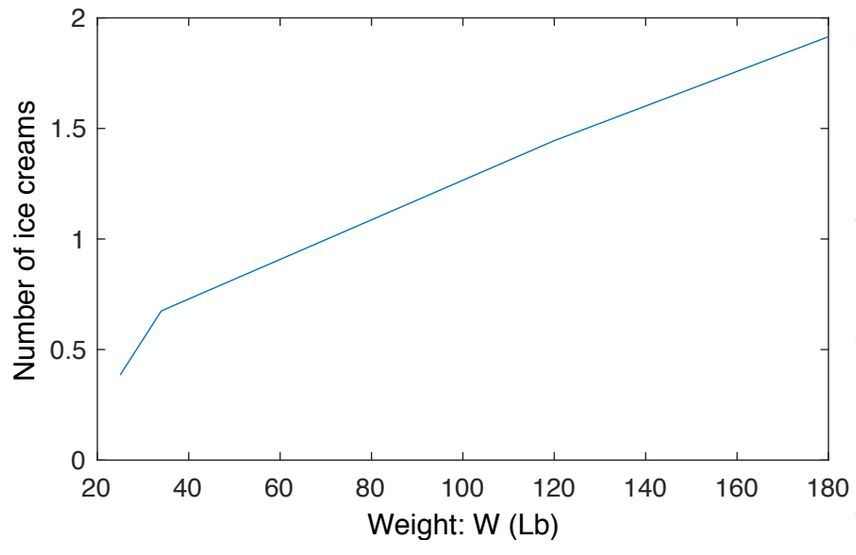
Things to watch out for…

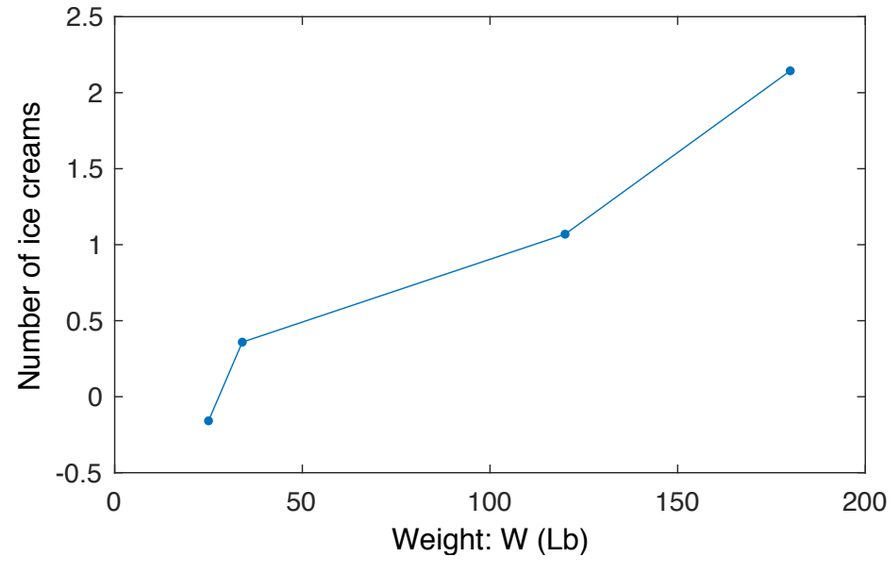
- Bounding box
- Powerpoint usually rasterizes pdf automatically (be careful with the size)
- Colors: CMYK vs RGB
- Beware light & dark colors
  - Yellow cannot be seen against white on screen
  - Dark colors ~ black for lines with small weight

Bars versus lines versus point…

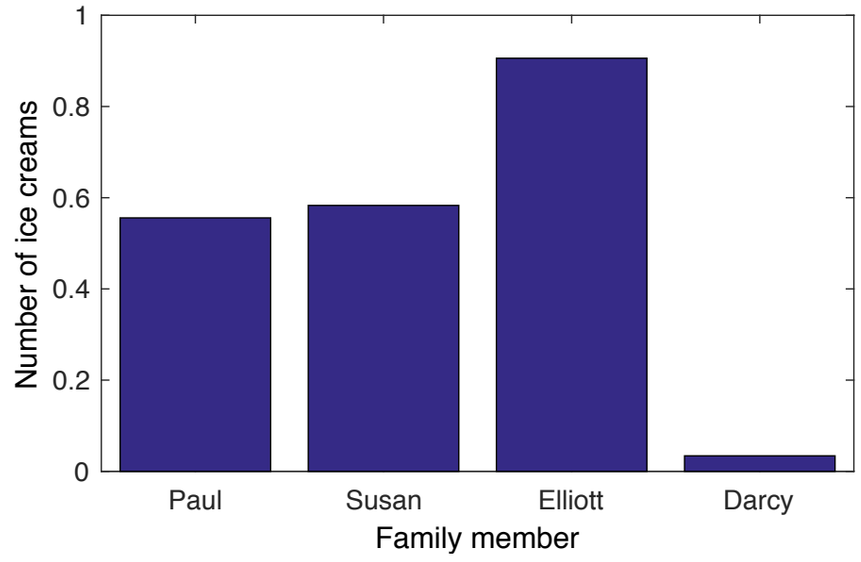


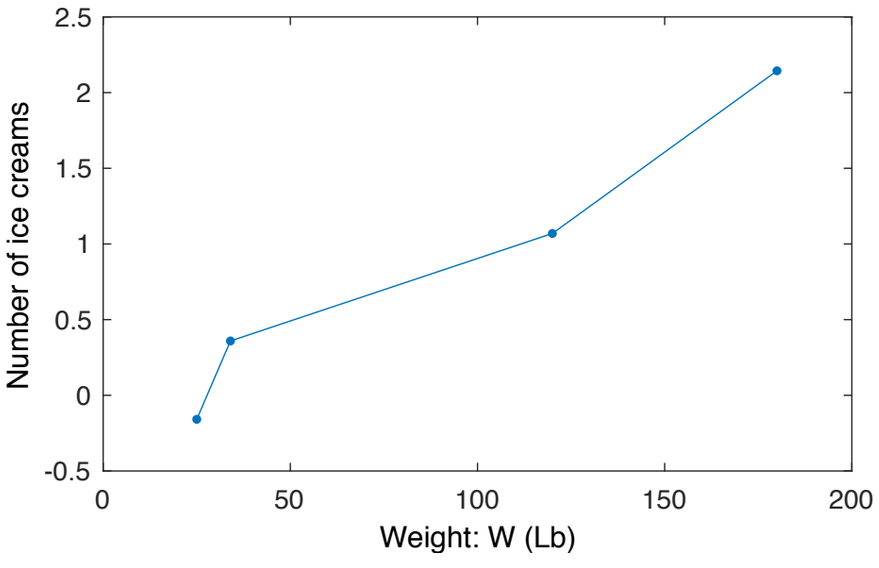






Bars versus lines versus point…





- Does it make sense to interpolate?
  - No (Bar plot)
  - Yes (Line plot)
- Exp data:
  - Show values!

Importance of white space…

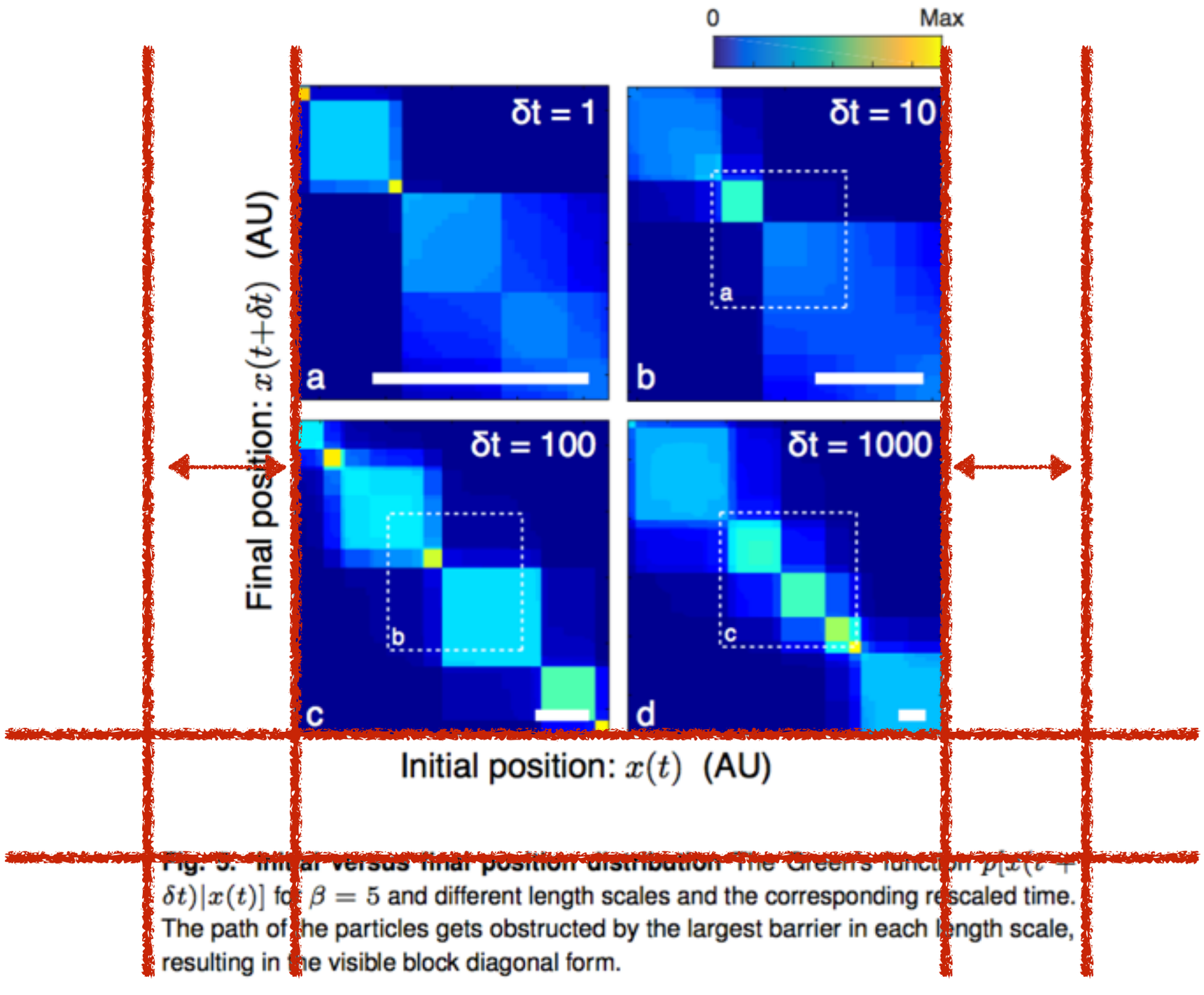
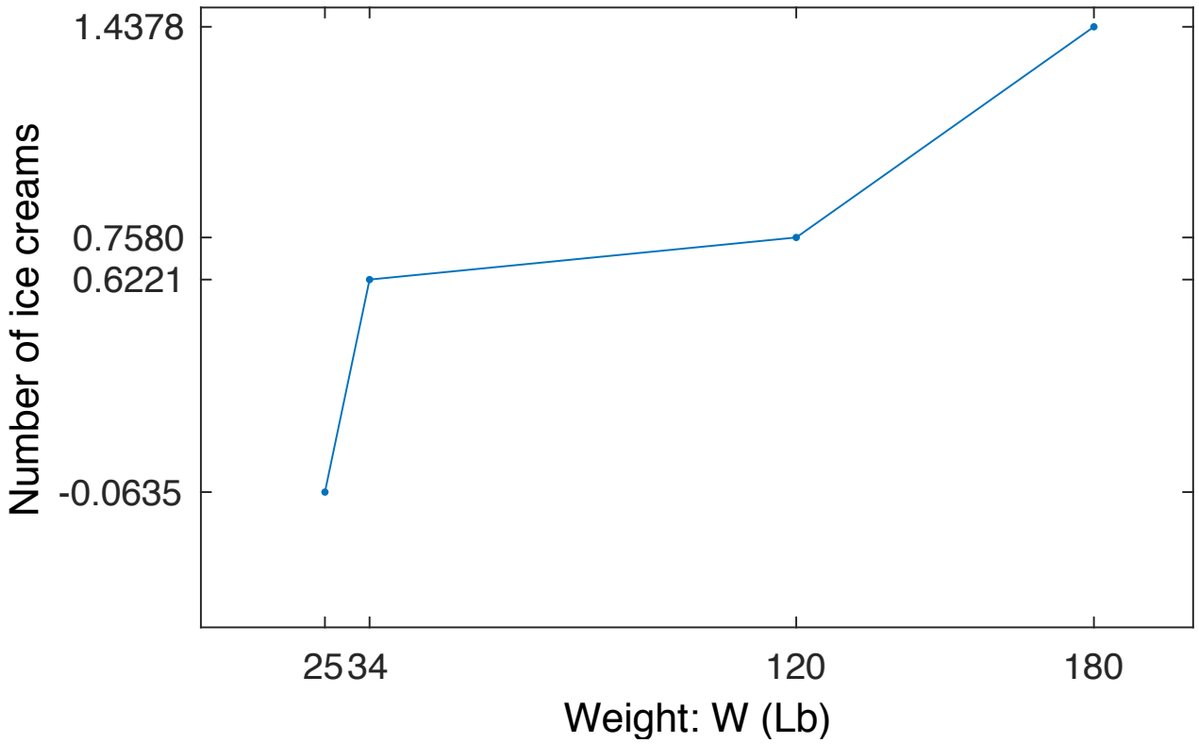


Fig. 5. Initial versus final position distribution. The Green's function $p[x(t+\delta t)|x(t)]$ for $\beta = 5$ and different length scales and the corresponding rescaled time. The path of the particles gets obstructed by the largest barrier in each length scale, resulting in the visible block diagonal form.

Too much Tufte-ness

- Some have argued that only measured values should be ticked and labeled on plots…



- Are you nuts?!?