Tips for preparing publication-worthy figures in Inkscape

Paul Whitford

CTBP Tech Talk

11/20/2024

Goal

- Cover basic figure manipulation strategies that can be applied using Inkscape
- We will not make a professional image, but you will learn the tools and tips

General considerations when making figures

- Avoid large blank space
- Use large characters and consistent fonts in/across figures
- Use thick lines
- Use colors that contrast
- Don’t include unnecessary information/data
- You should only make one point with each figure
- Use consistent colors throughout the figures
- Use consistent colors between molecular representations and plots
- Panels in a figure should be about the same size and their edges should align as well as possible

Types of graphics

- Vector Graphics
  - “Vector graphics are a form of computer graphics in which visual images are created directly from geometric shapes defined on a Cartesian plan, such as points, lines, curves and polygons.” - https://en.wikipedia.org/wiki/Vector_graphics
  - Examples include:
    - PS – PostScript
    - EPS – Encapsulated PostScript
    - AI – Adobe Illustrator
    - SVG – Scalable Vector Graphics
- Bitmaps graphics
  - Image formed by a specific number of pixels
  - Examples include:
    - GIF – Graphics Interchange Format
    - JPEG – Joint Photographic Experts Group
    - PNG – Portable Network Graphics
    - TIFF - Tag Image File Format

Inkscape

- https://inkscape.org
- Software for vector graphics manipulation
- Can include bitmap elements, though editing them is probably better with other software (e.g. GIMP; https://www.gimp.org)
- Free – works as well as Adobe Illustrator (usually)

Some basic Inkscape concepts

- Grouping
- Layers
- Line styles
- Cropping bitmaps
- Alignment of panels
- Color options
- Unicode usage
  - We won’t cover. But, it is a great way to add symbols

Make sample SVG files in gnuplot

If you have gnuplot on your machine, you can generate a couple sample SVG files with the following commands

```
>set terminal svg
>set output "curve.svg"
>plot cos(x)
>set output "curve.2.svg”
>plot cos(100*x)
```

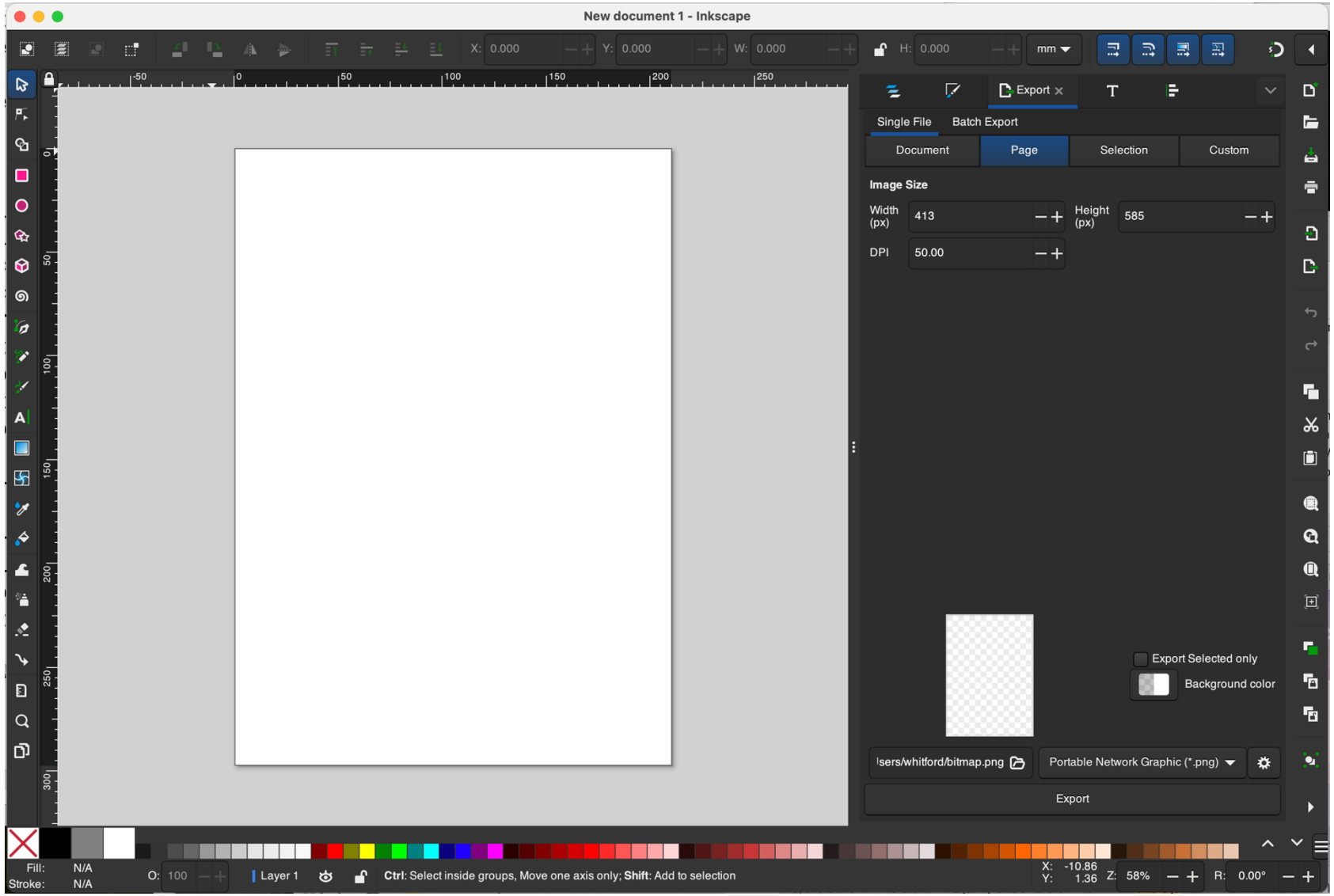
If you don’t have gnuplot, you can access curve.svg and curve.2.svg in the tech talk git repo.

Inside of an SVG file

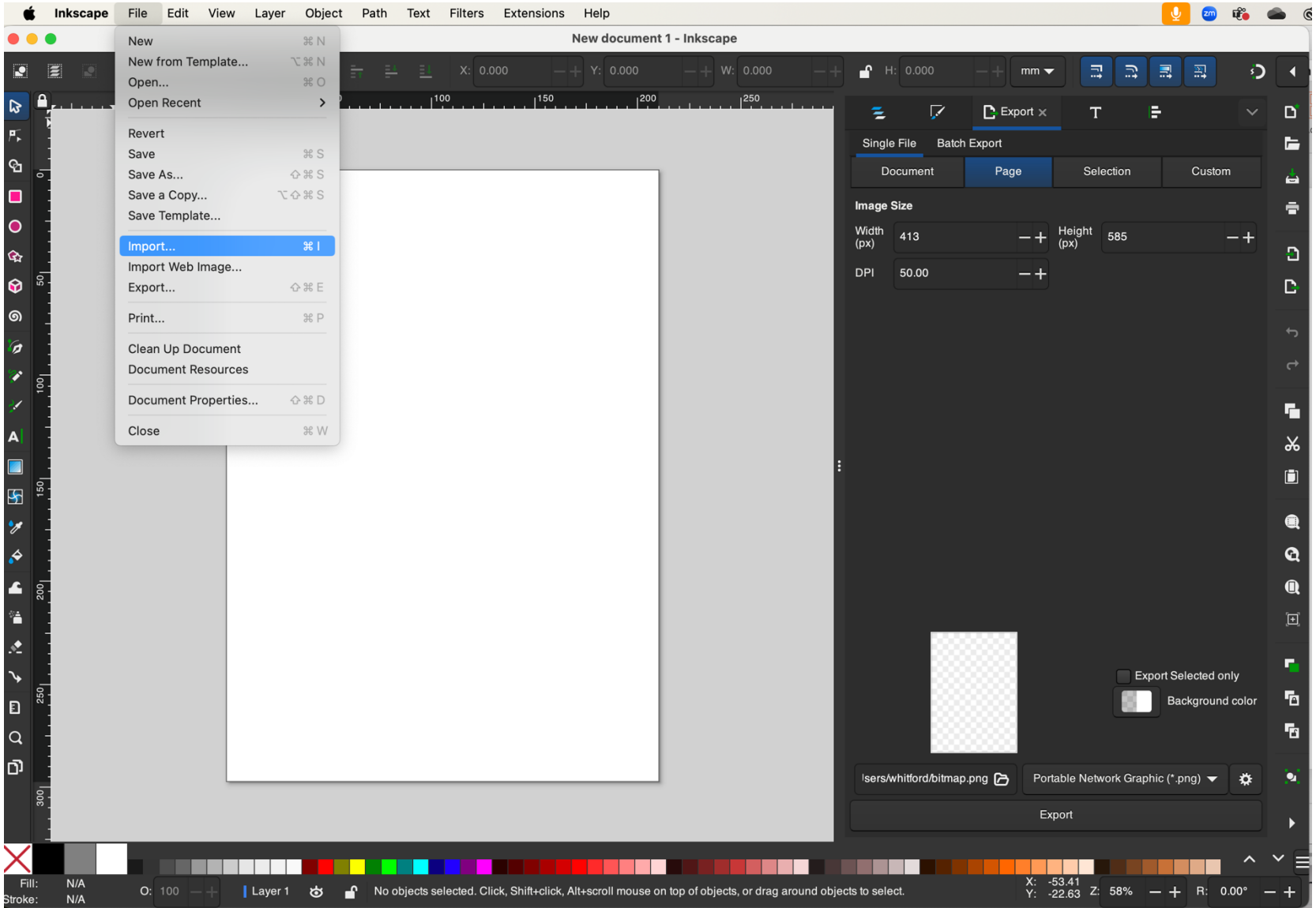
images — vi curve.svg — 104×34

```
<?xml version="1.0" encoding="utf-8"  standalone="no"?>
<svg
 width="600" height="480"
 viewBox="0 0 600 480"
 xmlns="http://www.w3.org/2000/svg"
 xmlns:xlink="http://www.w3.org/1999/xlink"
>

<title>Gnuplot</title>
<desc>Produced by GNUPLOT 5.4 patchlevel 1 </desc>

<g id="gnuplot_canvas">

<rect x="0" y="0" width="600" height="480" fill="none"/>
<defs>

        <circle id='gpDot' r='0.5' stroke-width='0.5' stroke='currentColor'/>
        <path id='gpPt0' stroke-width='0.222' stroke='currentColor' d='M-1,0 h2 M0,-1 v2'/>
        <path id='gpPt1' stroke-width='0.222' stroke='currentColor' d='M-1,-1 L1,1 M1,-1 L-1,1'/>
        <path id='gpPt2' stroke-width='0.222' stroke='currentColor' d='M-1,0 L1,0 M0,-1 L0,1 M-1,-1 L1,1
 M-1,1 L1,-1'/>
        <rect id='gpPt3' stroke-width='0.222' stroke='currentColor' x='-1' y='-1' width='2' height='2'/>
        <rect id='gpPt4' stroke-width='0.222' stroke='currentColor' fill='currentColor' x='-1' y='-1' wi
dth='2' height='2'/>
        <circle id='gpPt5' stroke-width='0.222' stroke='currentColor' cx='0' cy='0' r='1'/>
        <use xlink:href='#gpPt5' id='gpPt6' fill='currentColor' stroke='none'/>
        <path id='gpPt7' stroke-width='0.222' stroke='currentColor' d='M0,-1.33 L-1.33,0.67 L1.33,0.67 z
'/>
        <use xlink:href='#gpPt7' id='gpPt8' fill='currentColor' stroke='none'/>
        <use xlink:href='#gpPt7' id='gpPt9' stroke='currentColor' transform='rotate(180)'/>
        <use xlink:href='#gpPt9' id='gpPt10' fill='currentColor' stroke='none'/>
        <use xlink:href='#gpPt3' id='gpPt11' stroke='currentColor' transform='rotate(45)'/>
        <use xlink:href='#gpPt11' id='gpPt12' fill='currentColor' stroke='none'/>
```

Launch Inkscape

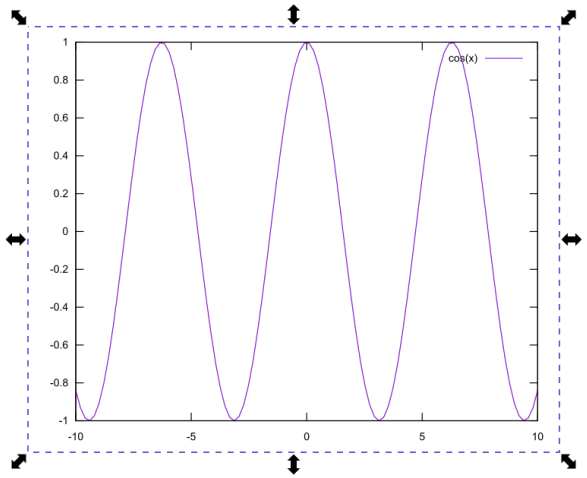


Import curve.svg



*New document 1 - Inkscape

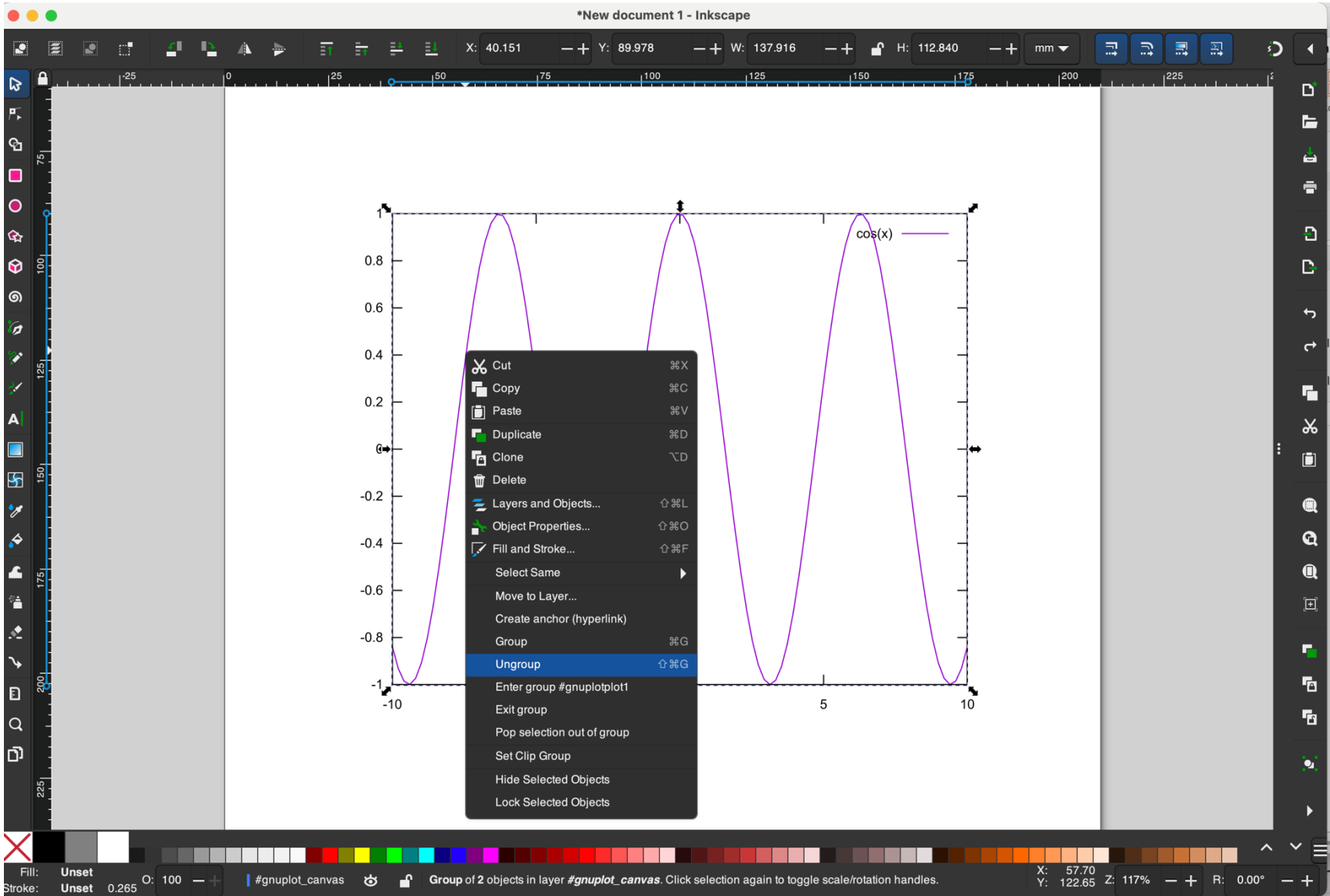
X: 25.851 Y: 85.175 W: 158.750 H: 127.000 mm



Fill: Unset
Stroke: Unset 0.265
O: 100
Layer 1
Ctrl: Select inside groups, Move one axis only; Shift: Add to selection
X: -54.31
Y: 120.84
Z: 58%
R: 0.00°

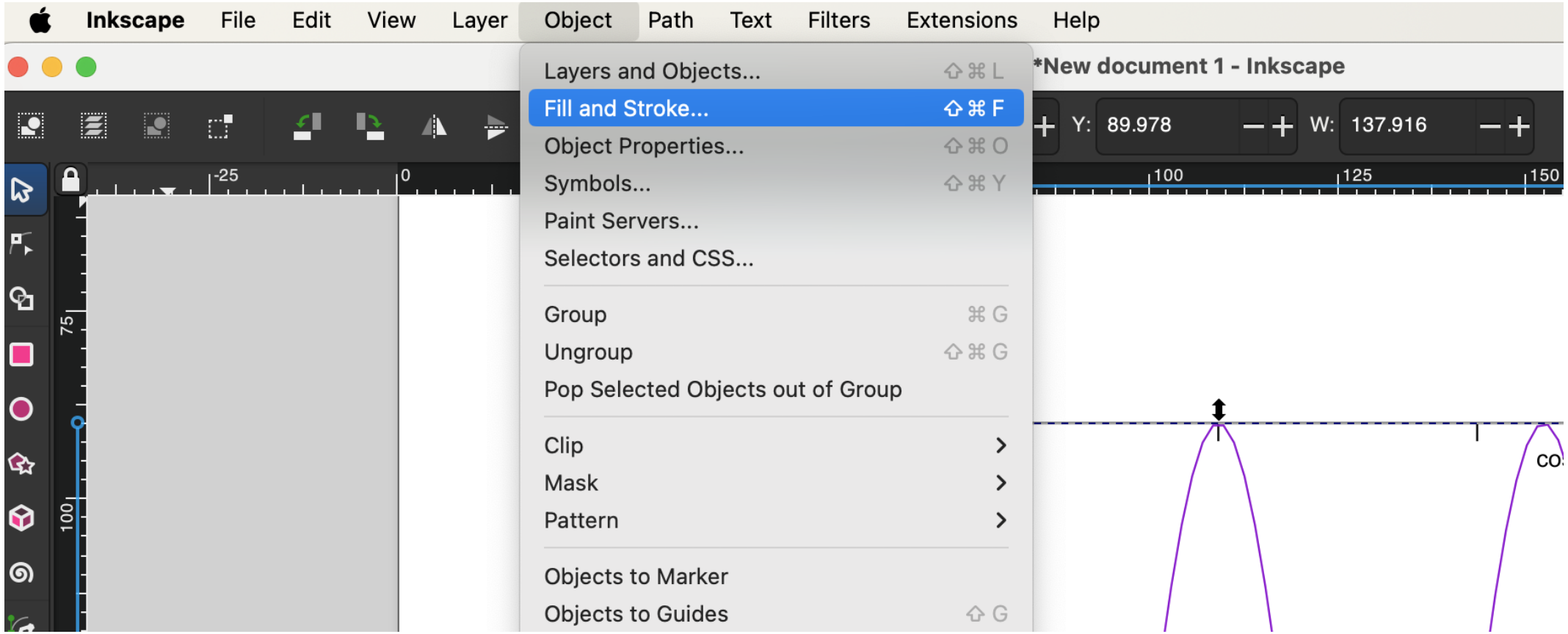
Grouping and Ungrouping

- Initially, all elements may be grouped into a single editable object.
- We typically want to access different elements of the object, which requires that we ungroup the vectors.
- Note: Grouping may be hierarchical.
  - E.g. elements A and B can form a group. B may be a group of other elements

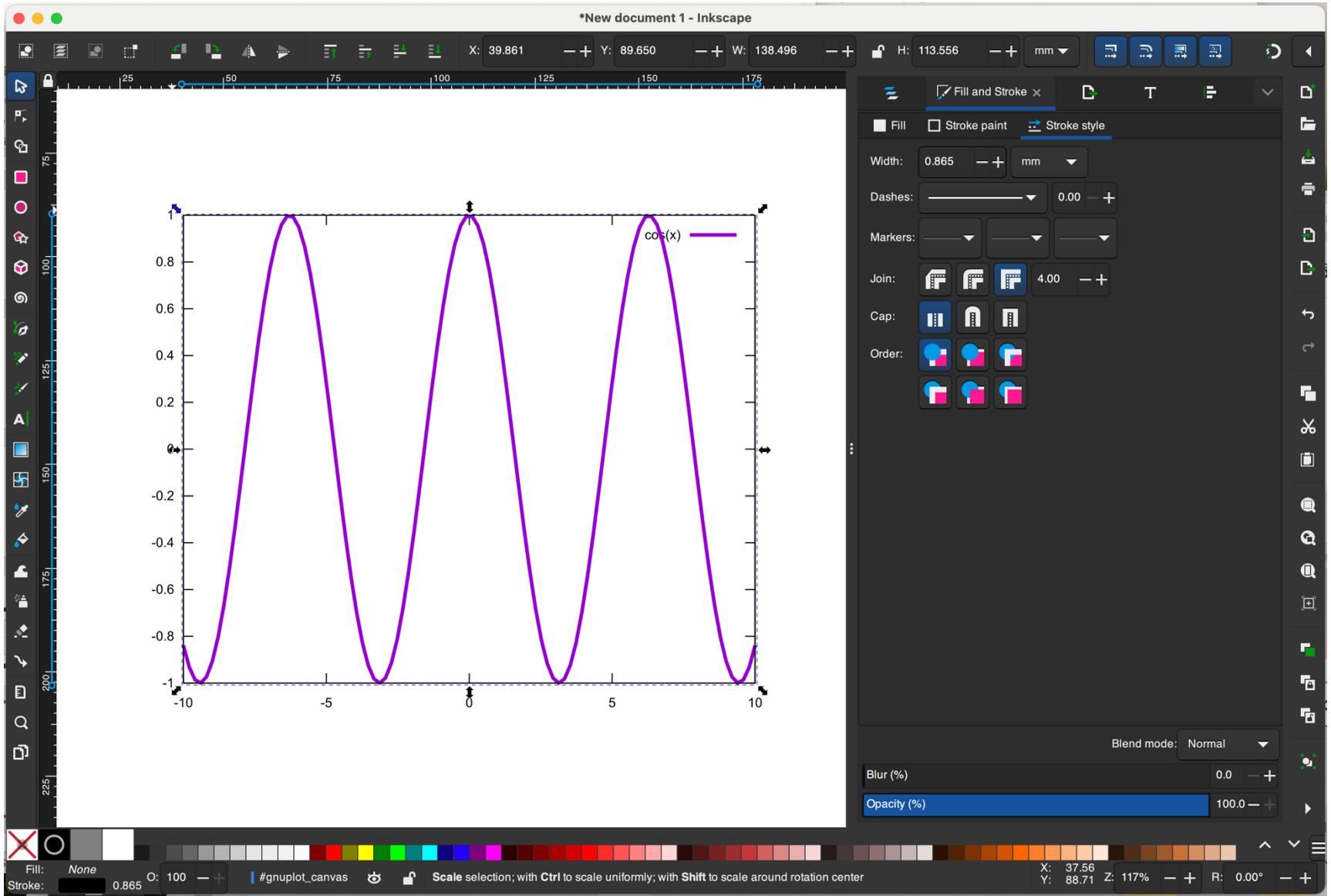


Edit the curve

- Select the curve
- Access the “Fill and Stroke” panel



Increase line width of the curve

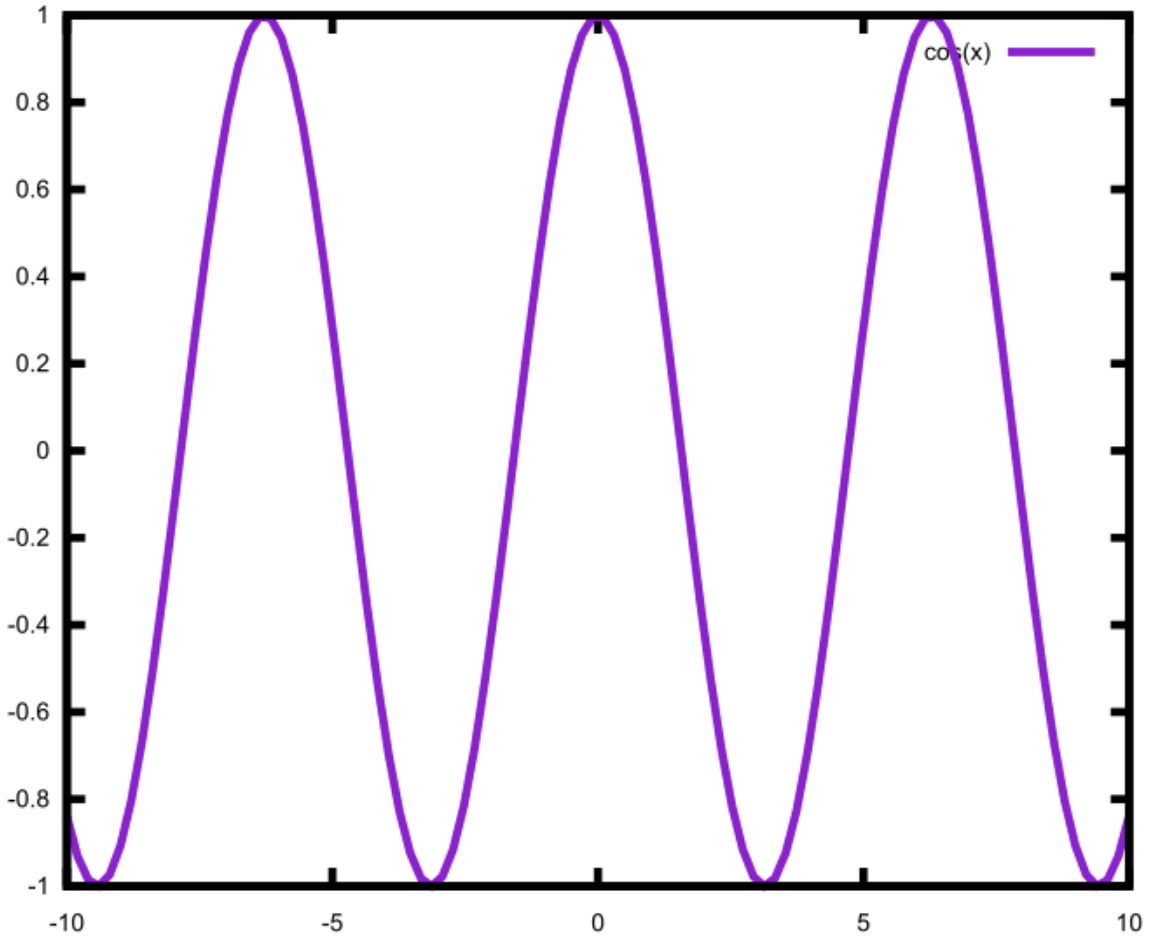


Can adjust each line/curve separately

Can select:

- Width
- style (dashed, solid)
- joints (sharp, round)
- caps of each line
- stroke and fill color
- transparency

Increase width of all lines



Select the whole image

Using “Fill and Stroke” panel, choose larger width

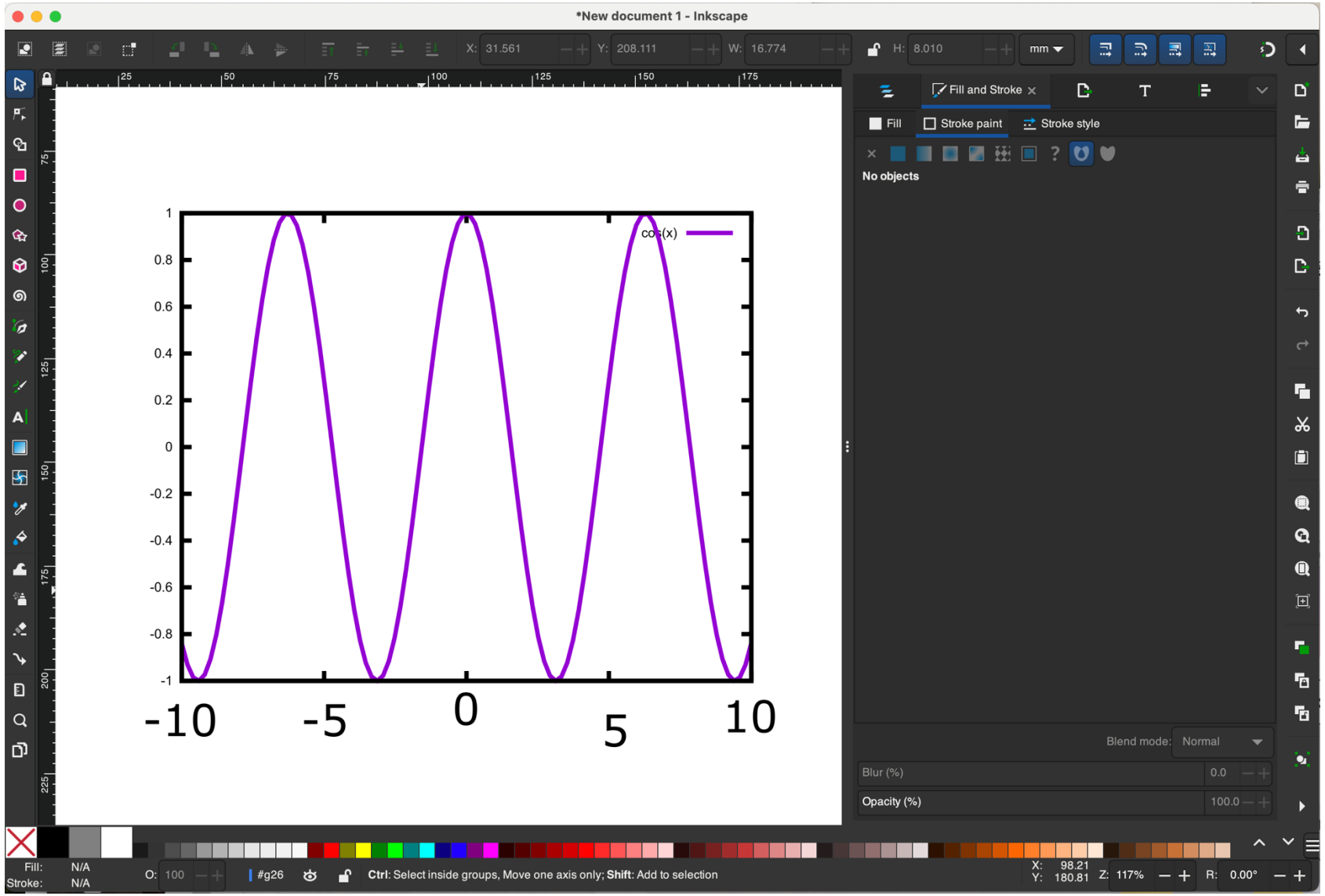
Delete and replace tick labels

Default labels often look pretty bad

Make sure to use the same font, style and size in all figures in a single manuscript

First, select and delete

Second, use “A” button to add new text boxes



Align the labels

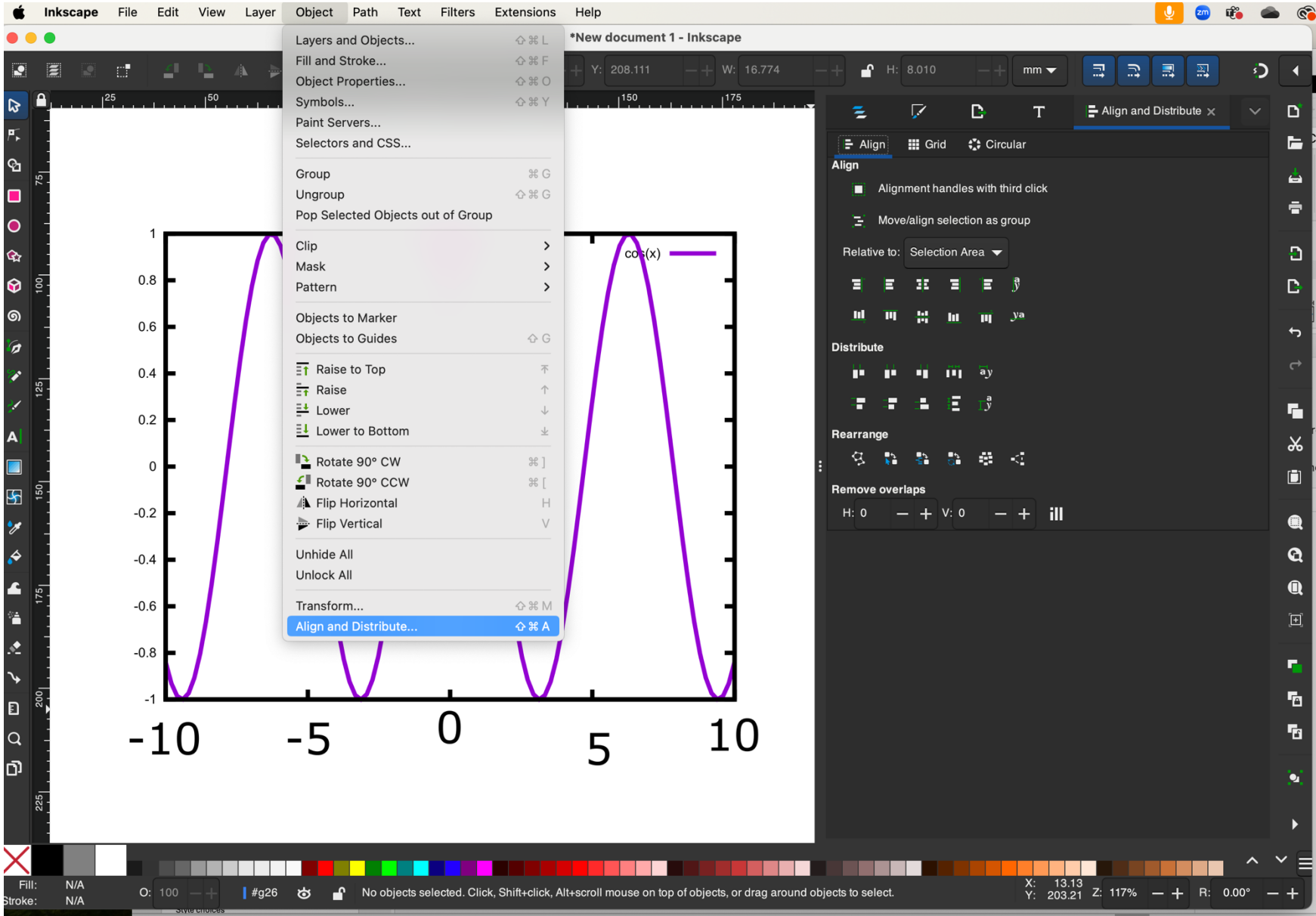
Open “Align and Distribute” panel

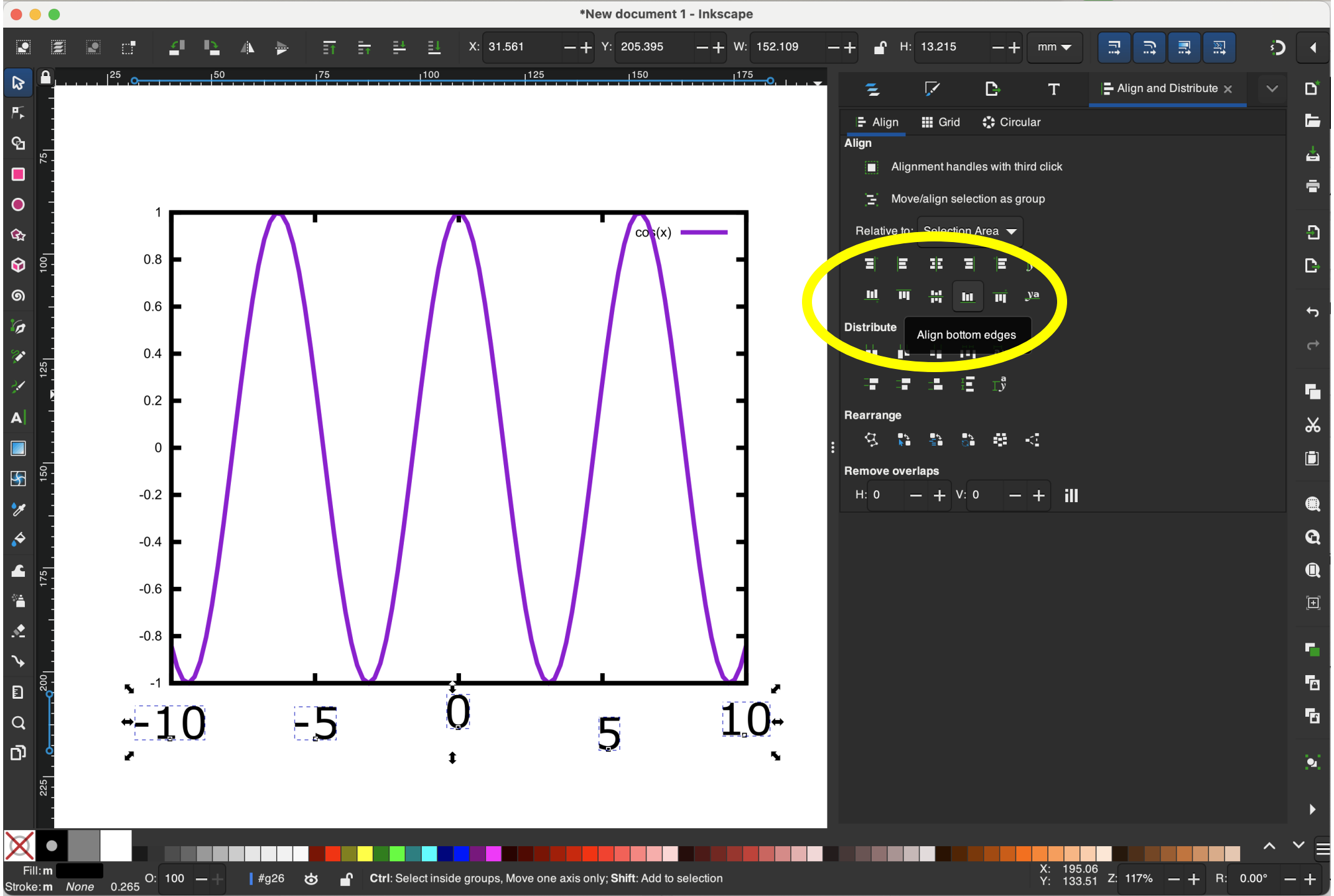
Select all elements you want to align

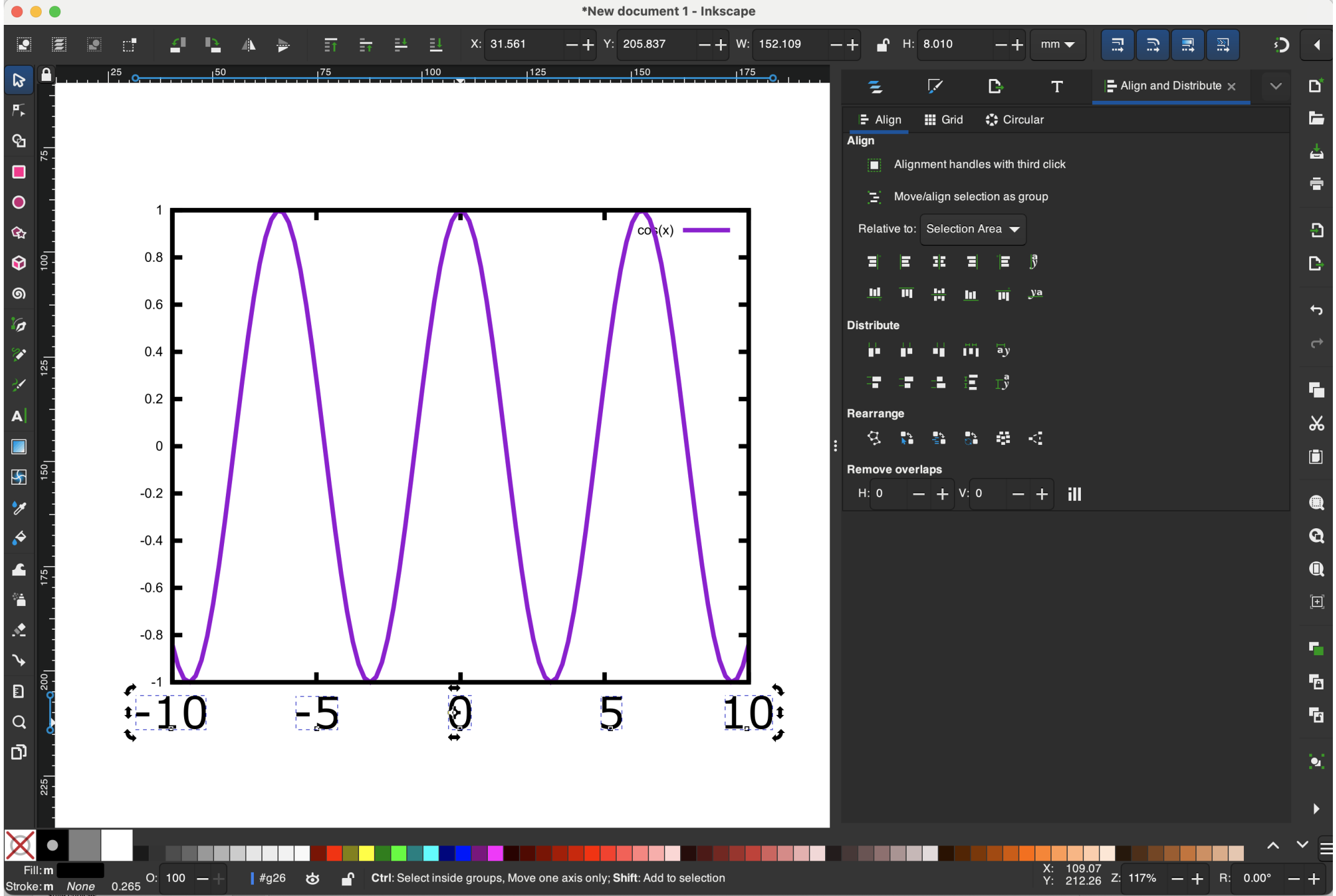
Align or distribute as you want

Align = place in a line, based on the top, bottom, middle, side, etc

Distribute = space the objects evenly in a direction




*New document 1 - Inkscape
X: 31.561
Y: 205.395
W: 152.109
H: 13.215
mm
Align and Distribute
Align
Grid
Circular
Align
Alignment handles with third click
Move/align selection as group
Relative to: Selection Area
Distribute
Align bottom edges
Rearrange
Remove overlaps
H: 0
V: 0
cos(x)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-10
-5
0
5
10
Fill: m
Stroke: m
None
0.265
O: 100
#g26
Ctrl: Select inside groups, Move one axis only; Shift: Add to selection
X: 195.06
Y: 133.51
Z: 117%
R: 0.00°


*New document 1 - Inkscape
X: 31.561
Y: 205.837
W: 152.109
H: 8.010
mm
Align and Distribute
Align
Grid
Circular
Align
Alignment handles with third click
Move/align selection as group
Relative to:
Selection Area
Distribute
Rearrange
Remove overlaps
H: 0
V: 0
cos(x)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-10
-5
0
5
10
Fill:
Stroke:
None
0.265
O: 100
#g26
Ctrl: Select inside groups, Move one axis only; Shift: Add to selection
X: 109.07
Y: 212.26
Z: 117%
R: 0.00°

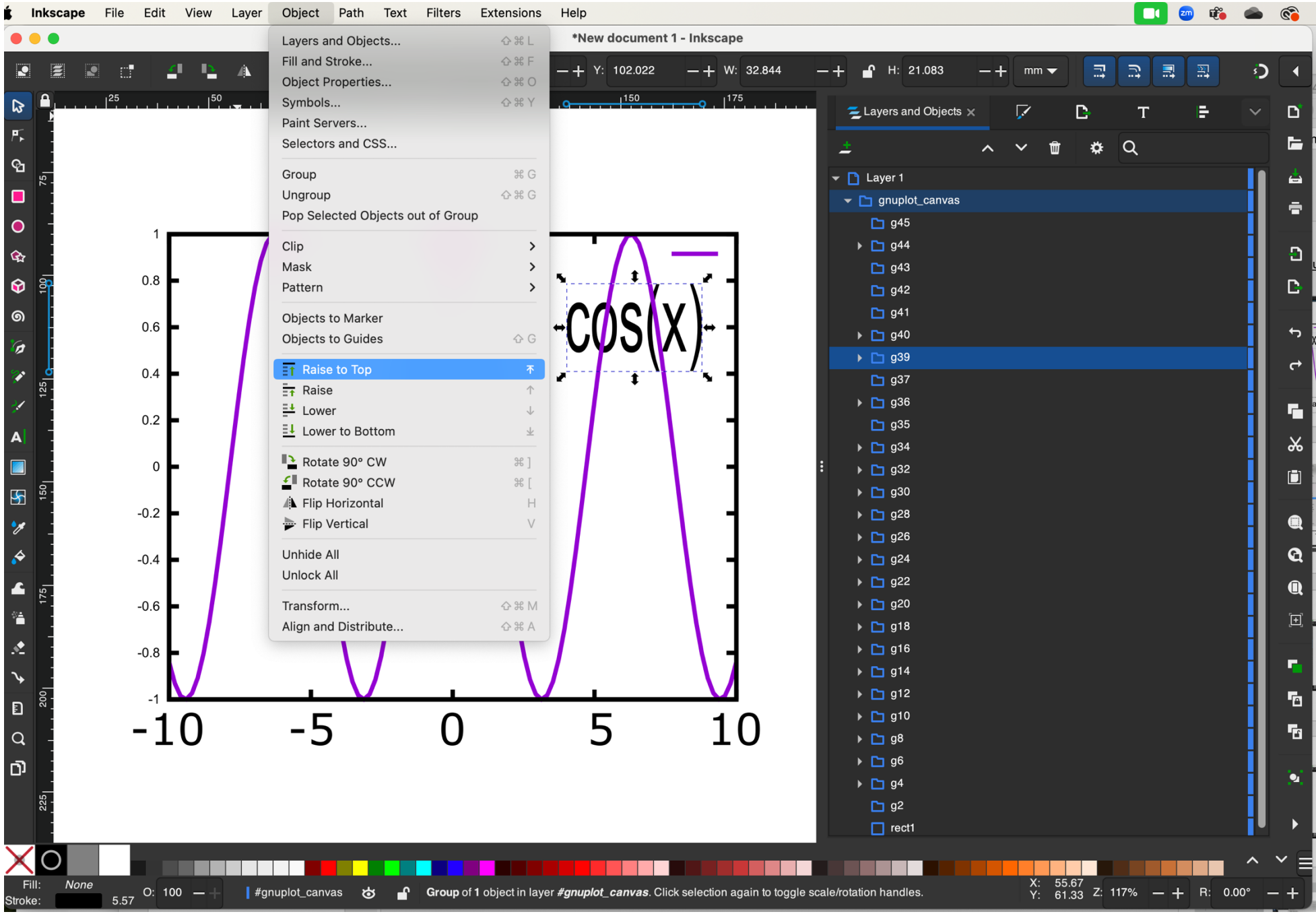
Layers

- Think of all the objects as sitting on top of transparencies. Content on the top transparency is visible and can cover content on lower levels.
- A layer is essentially a digital transparency that can be moved up/down
- Let’s move an object/group to the top layer

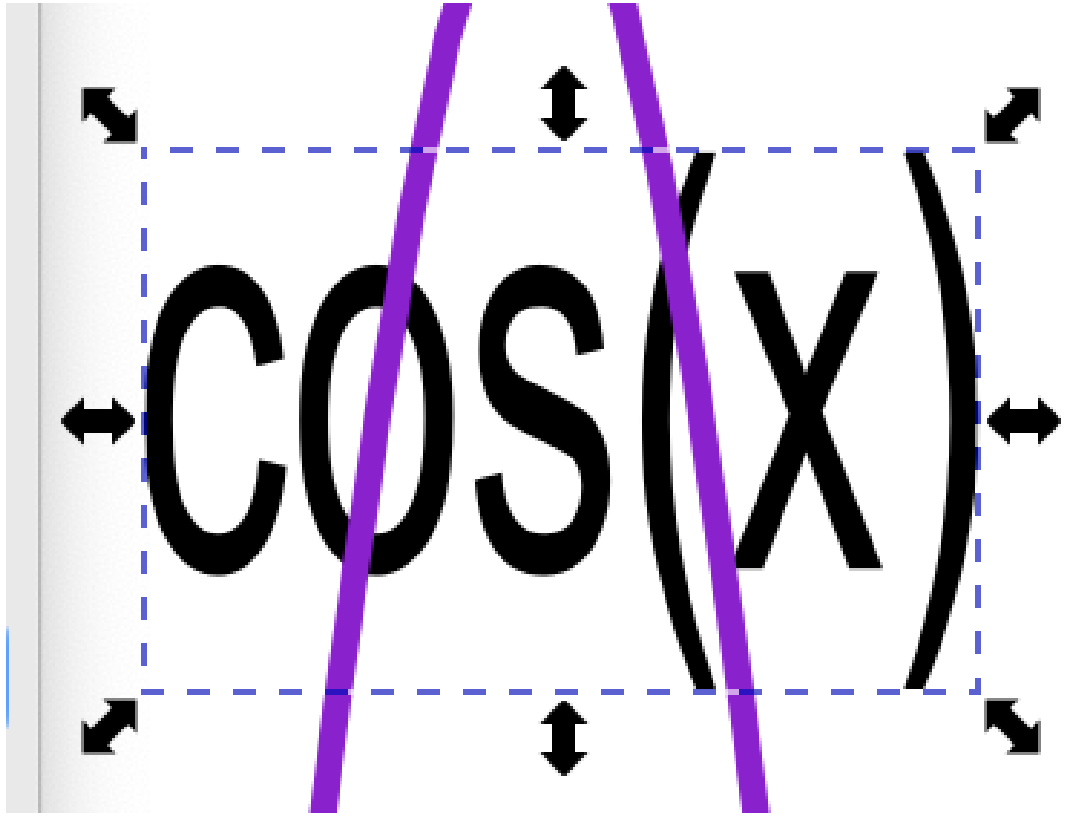
Select the “cos(x)” and make it larger

Occluded by the curve

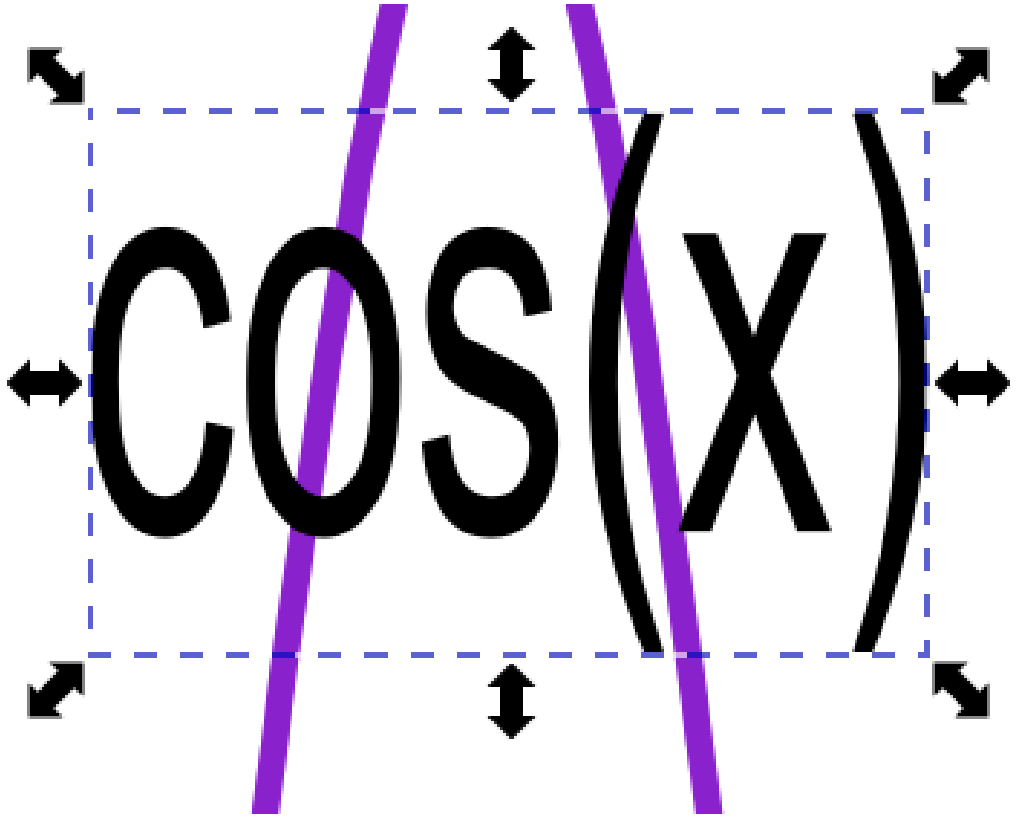
Let’s raise it above the curve



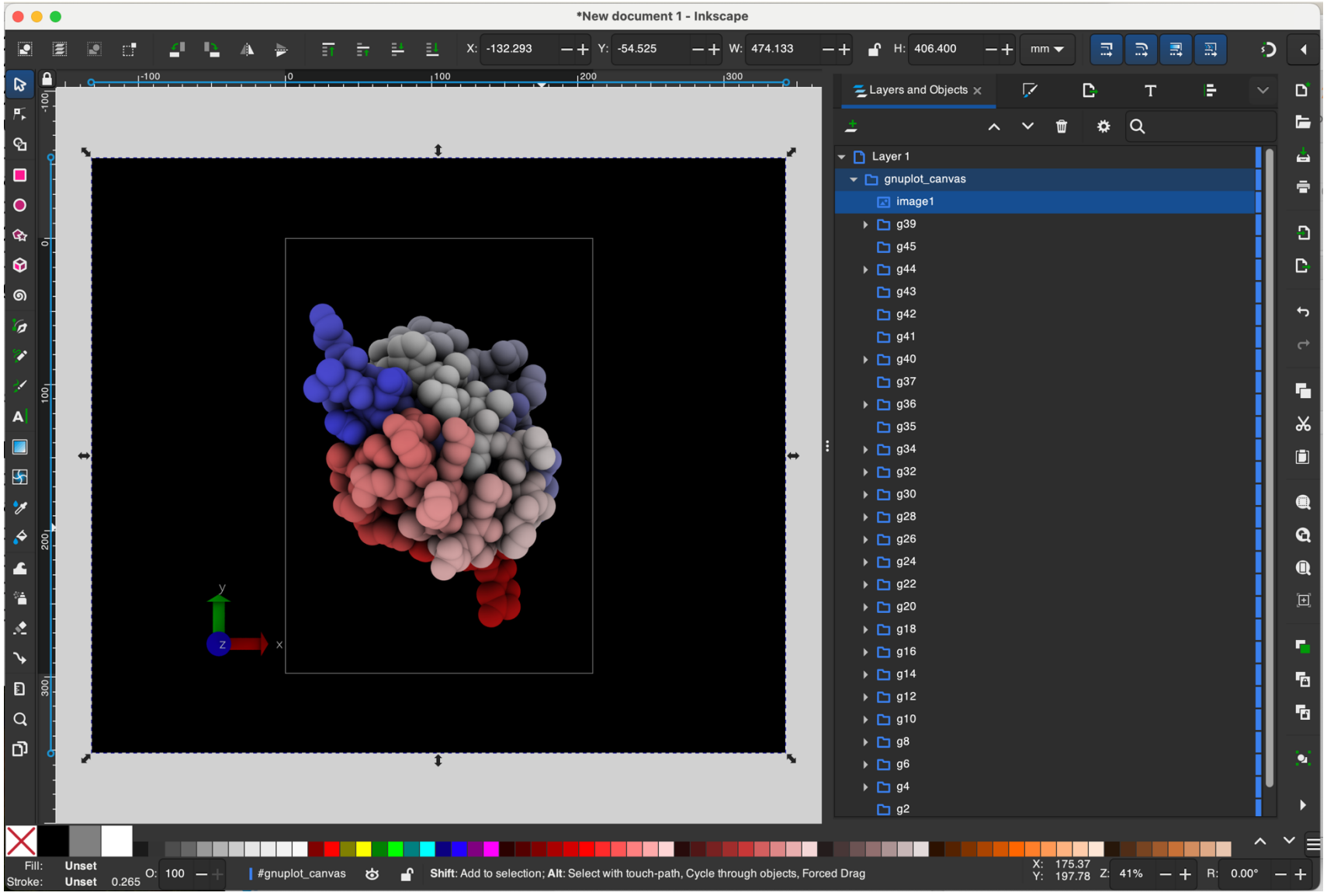
before



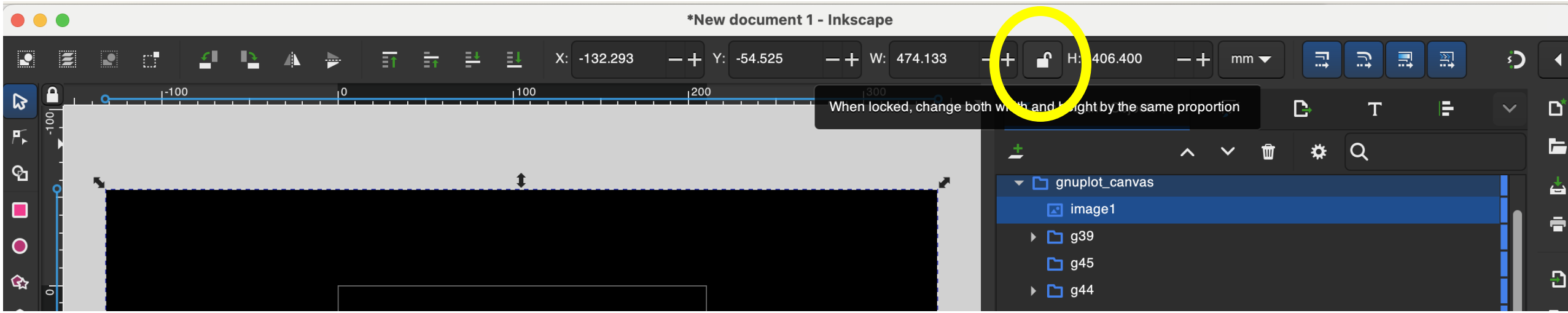
after



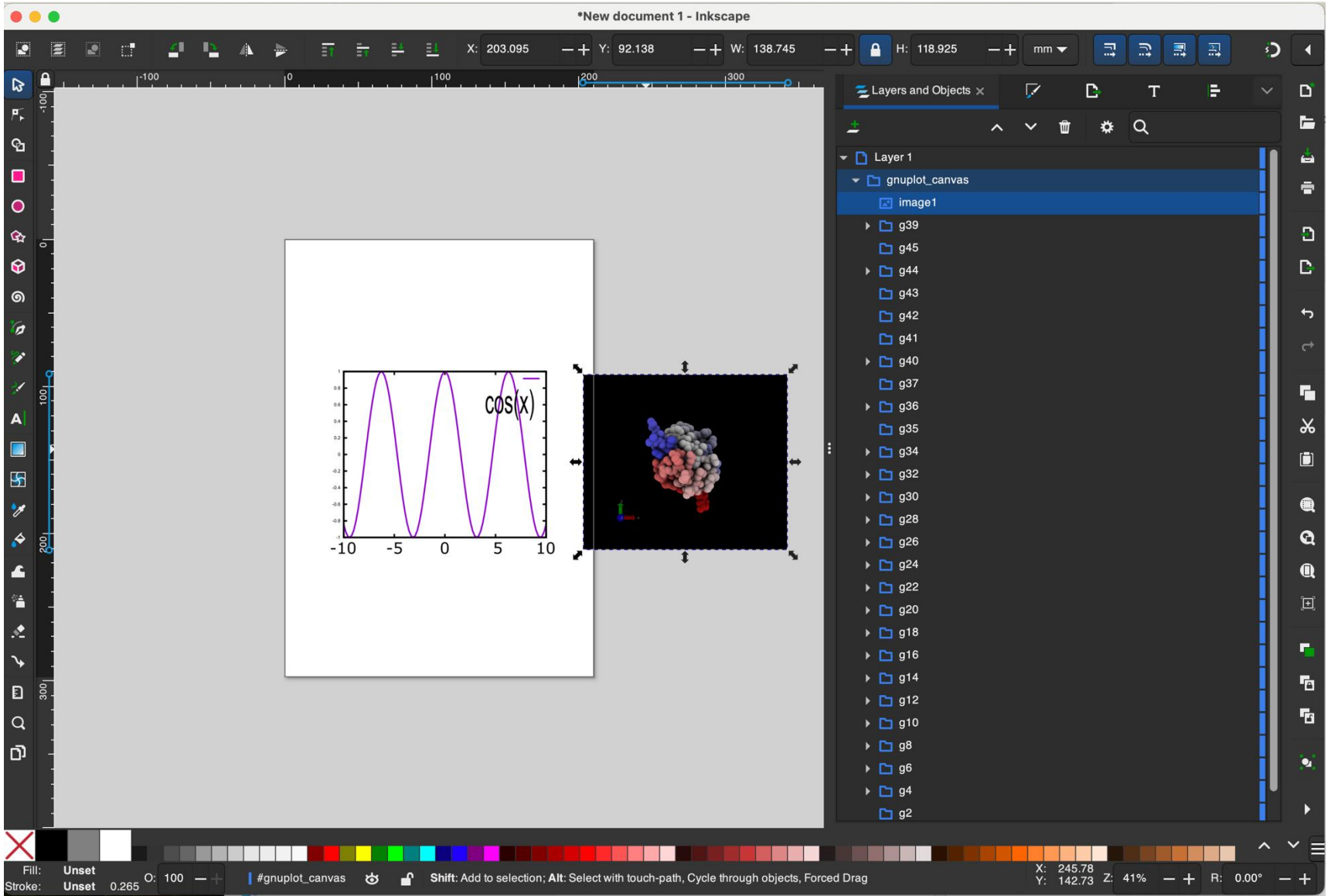
Import “black.tga”



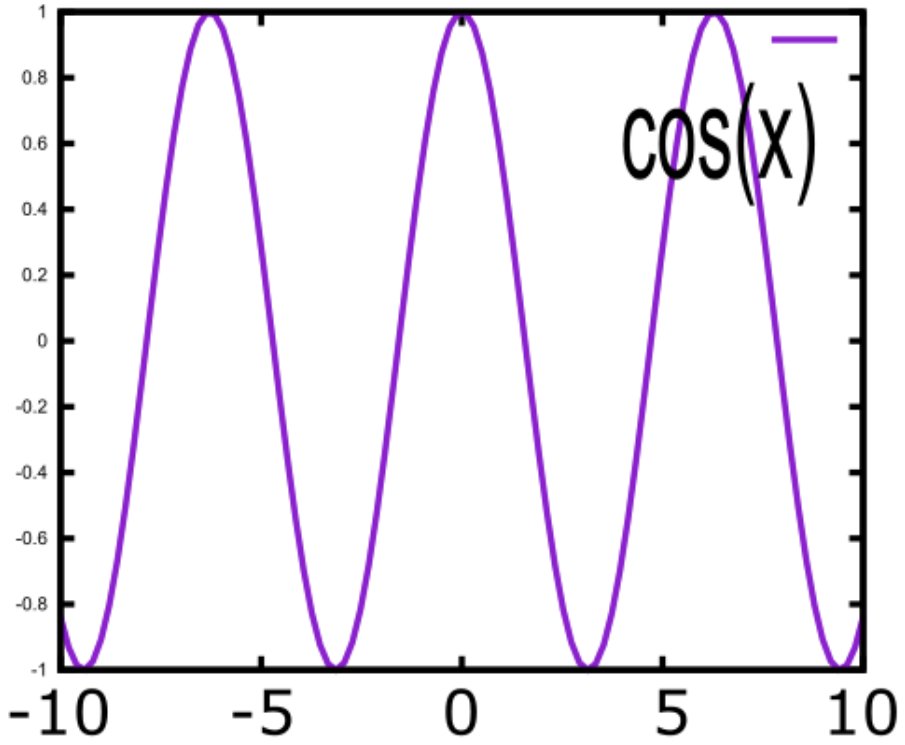
Lock the aspect ratio

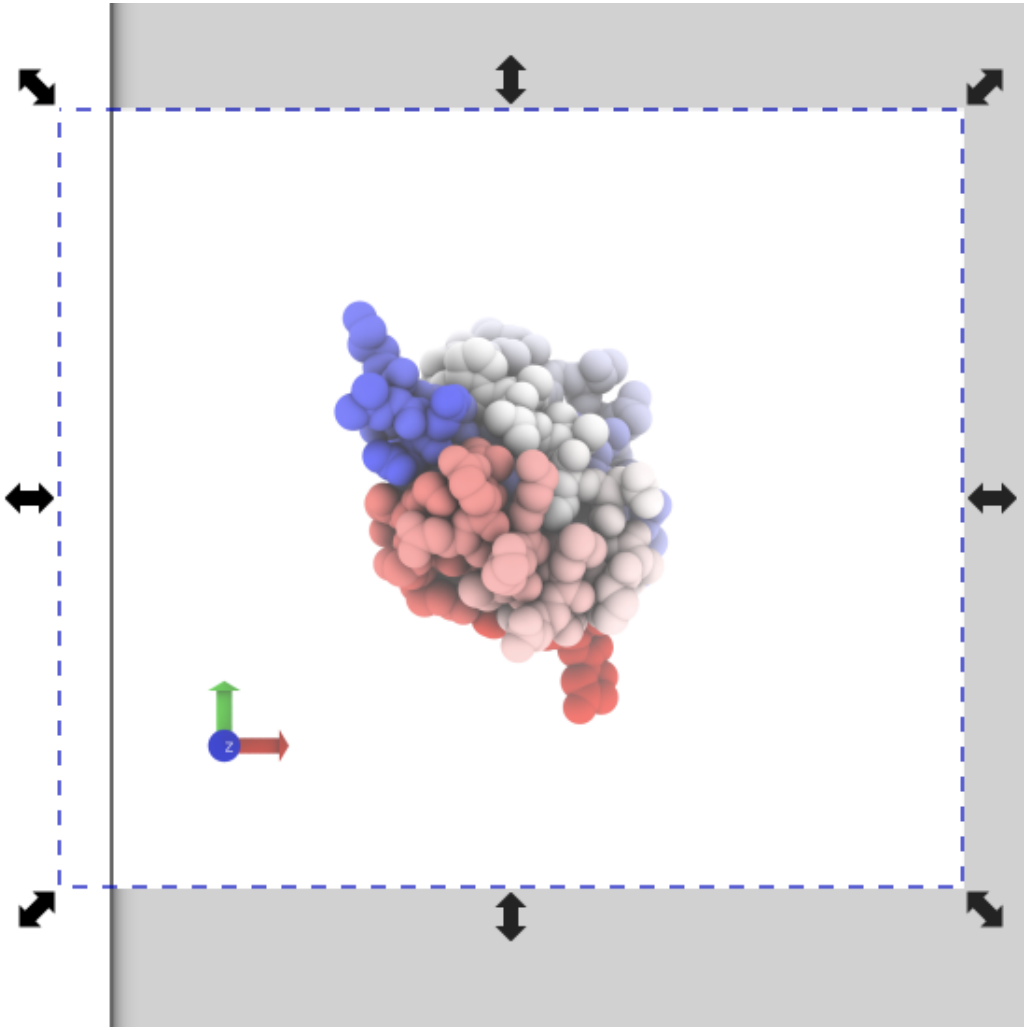


Resize and reposition



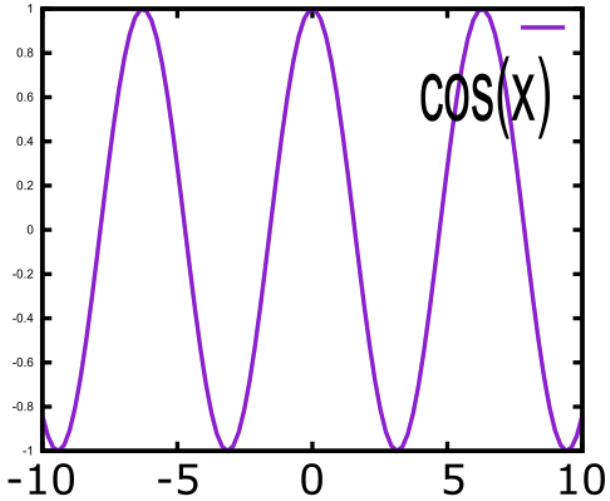
Delete and import “white.tga”

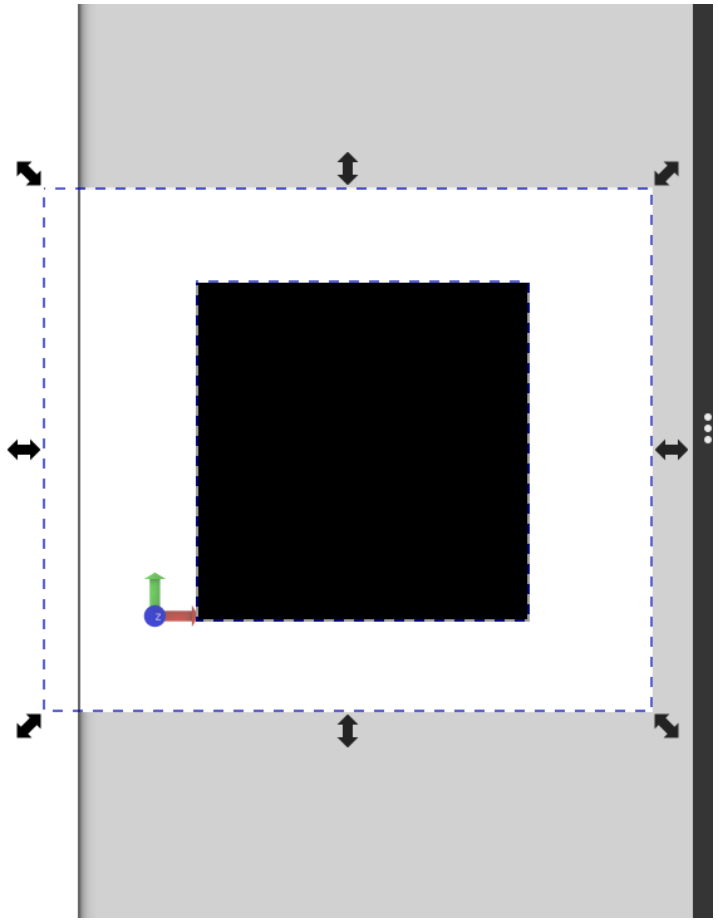




crop

If you want to crop and image, then draw a shape over it. In this case, a black rectangle

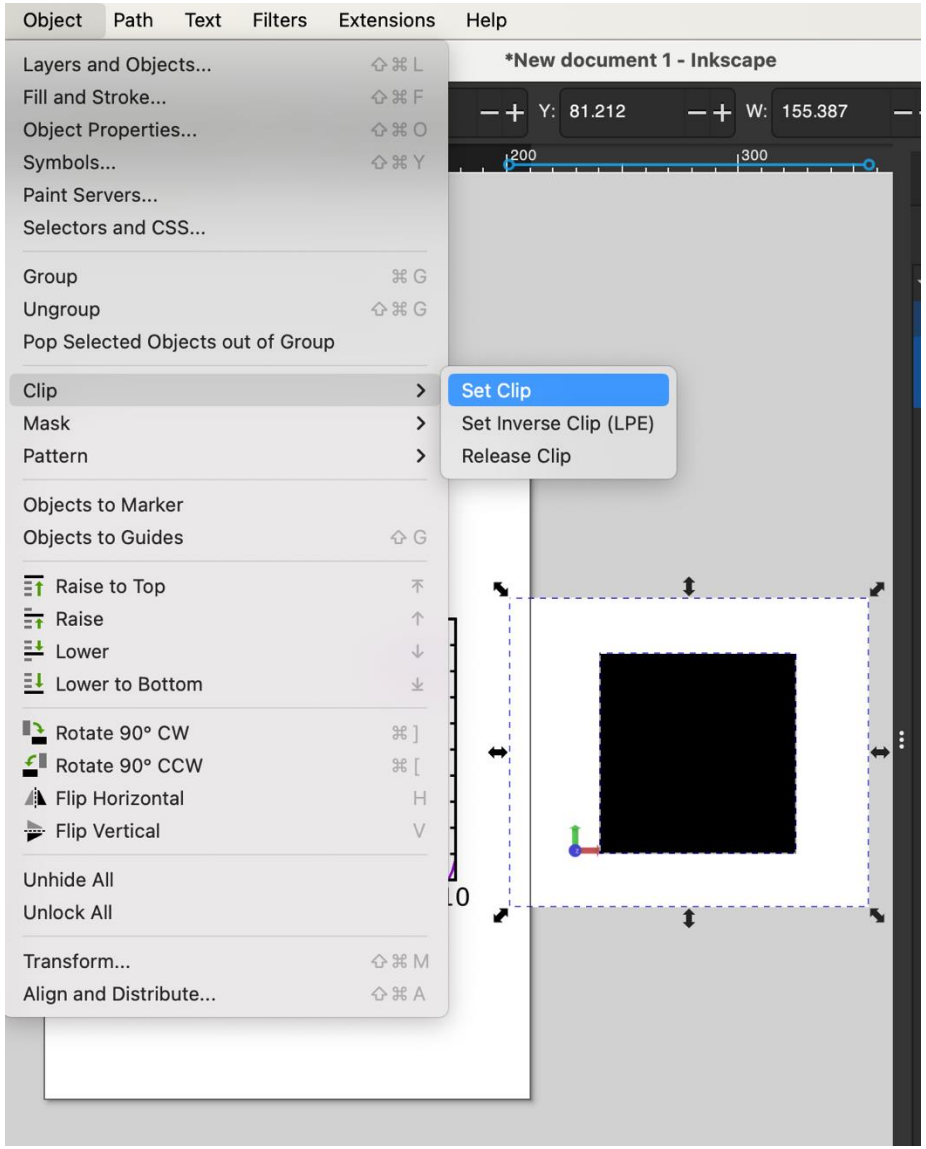


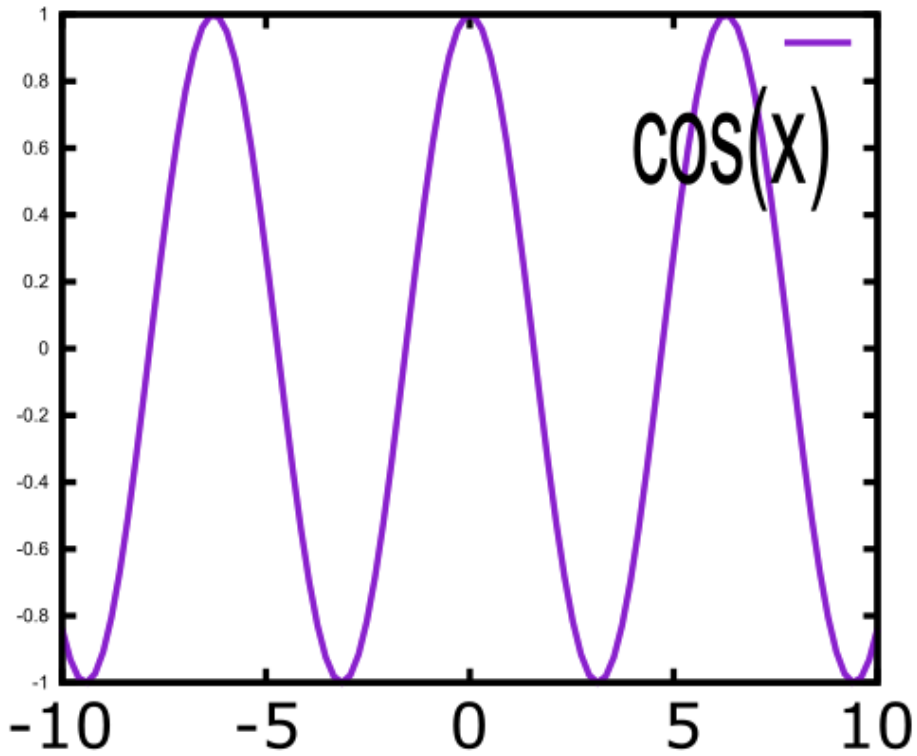


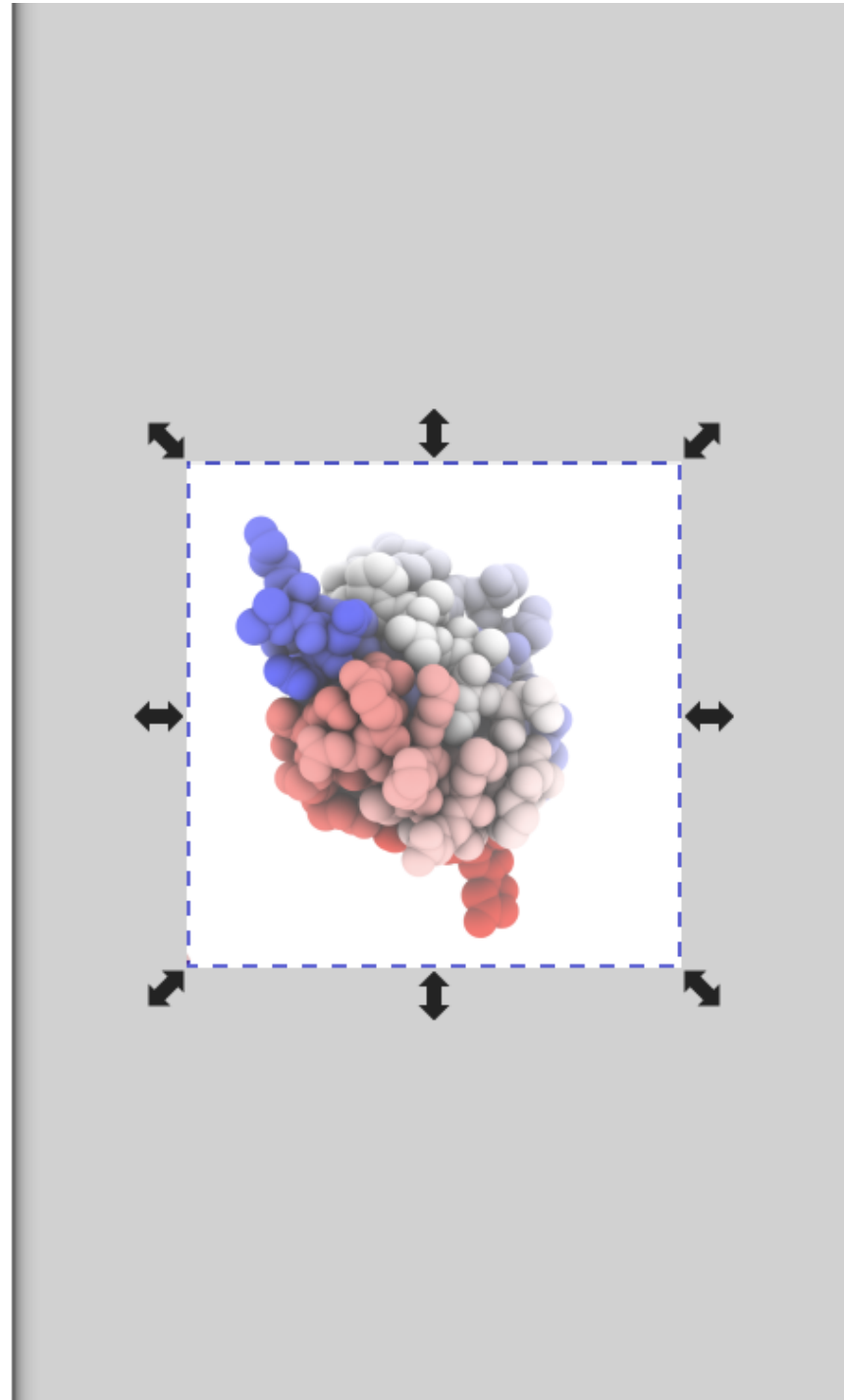
crop

With both the bottom image and the rectangle selected, click

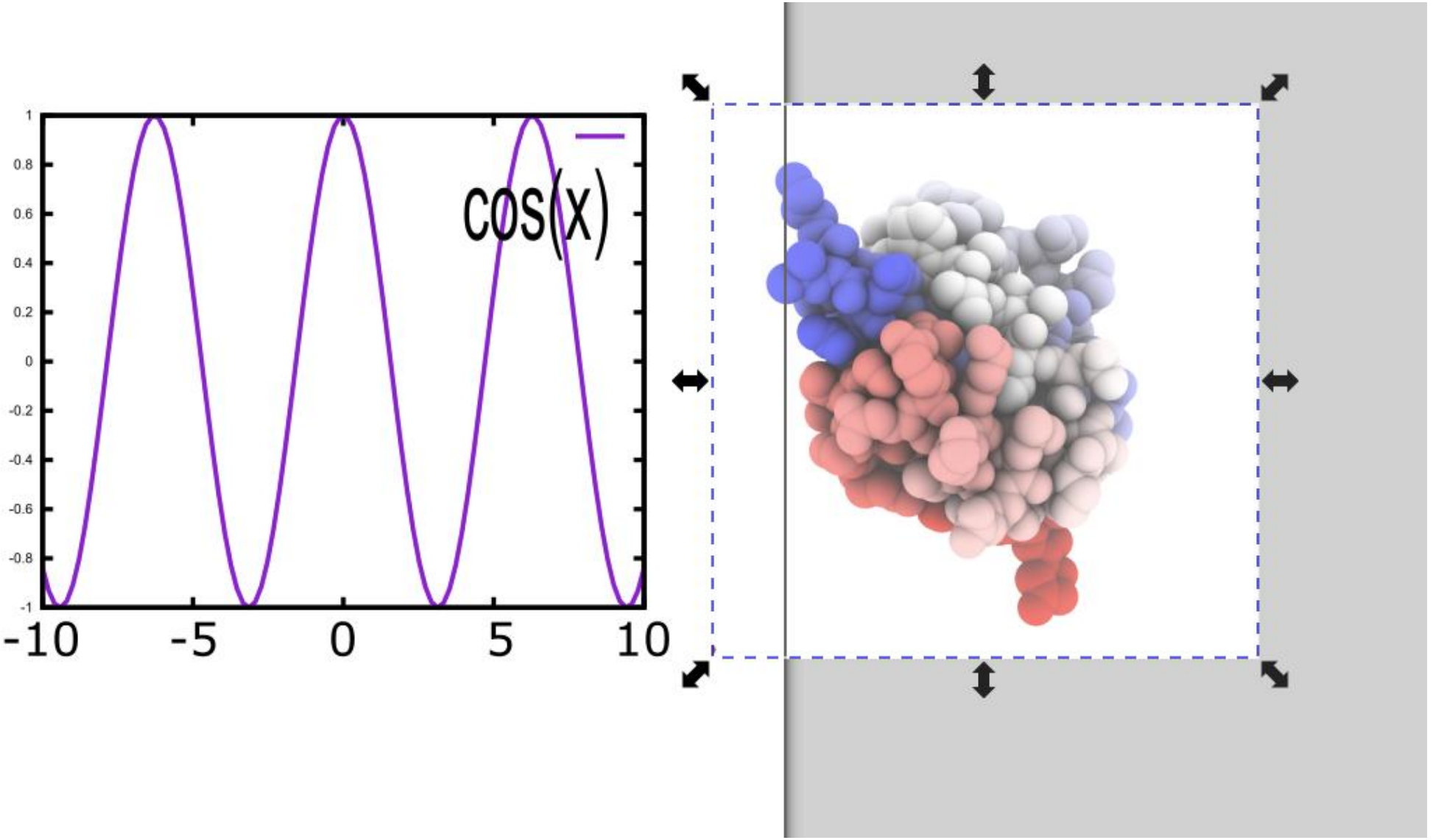
Object->Clip->Set Clip




cos(x)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-10
-5
0
5
10



Reposition and resize



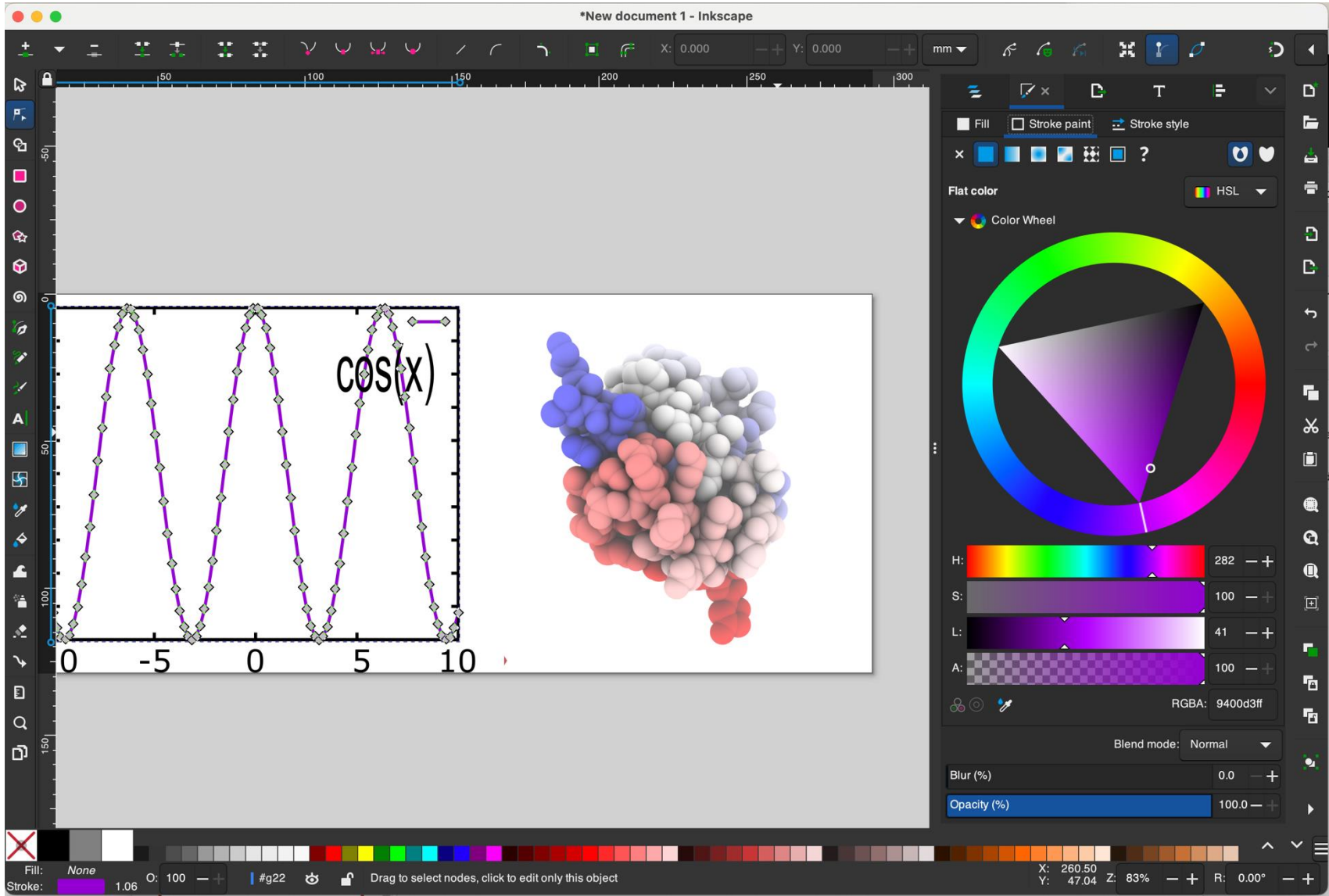
Color options

Select the curve

This may require going into multiple layers of the graph object

Go to “Stroke and Fill” panel

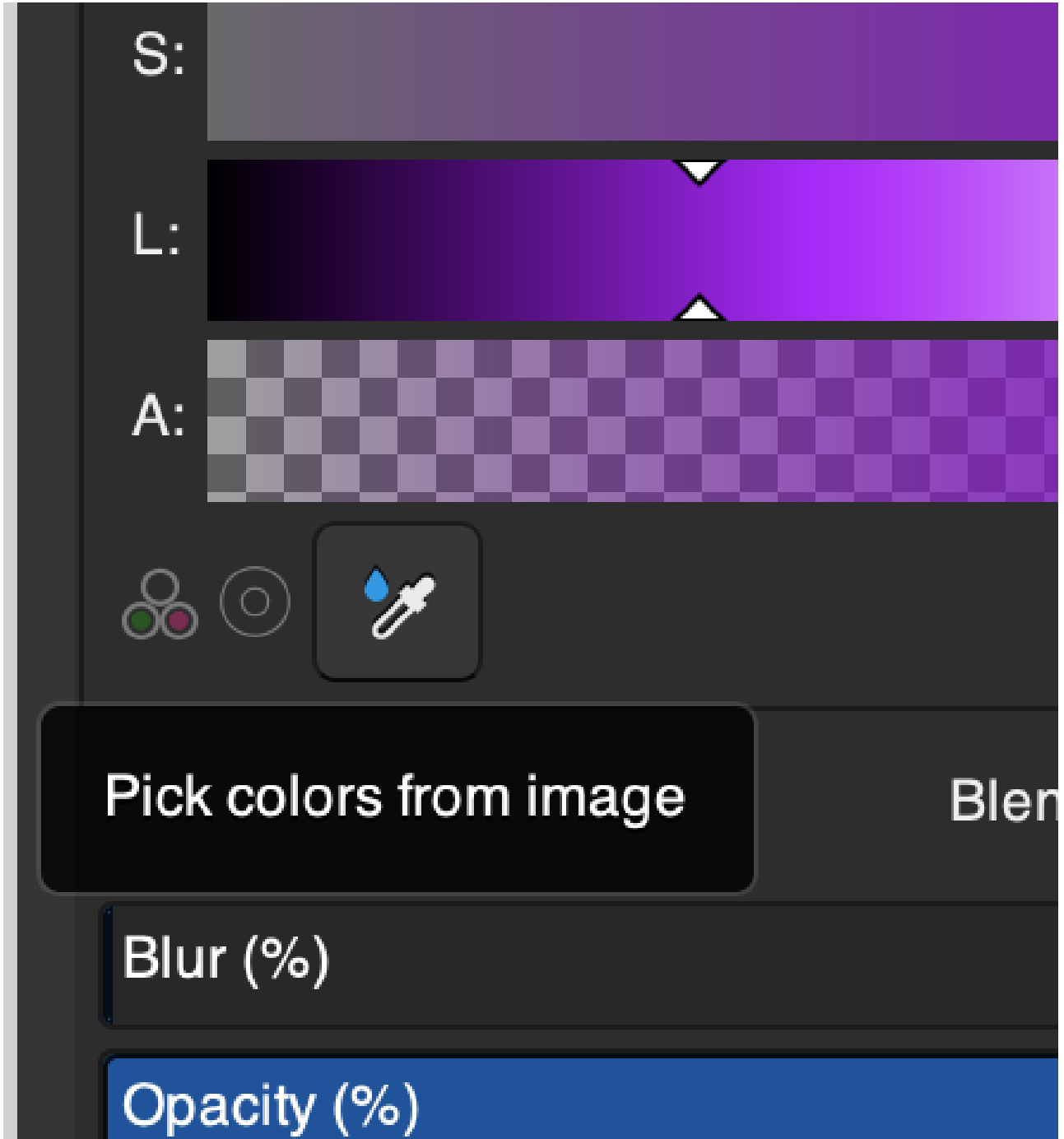
Select “Stroke paint” tab

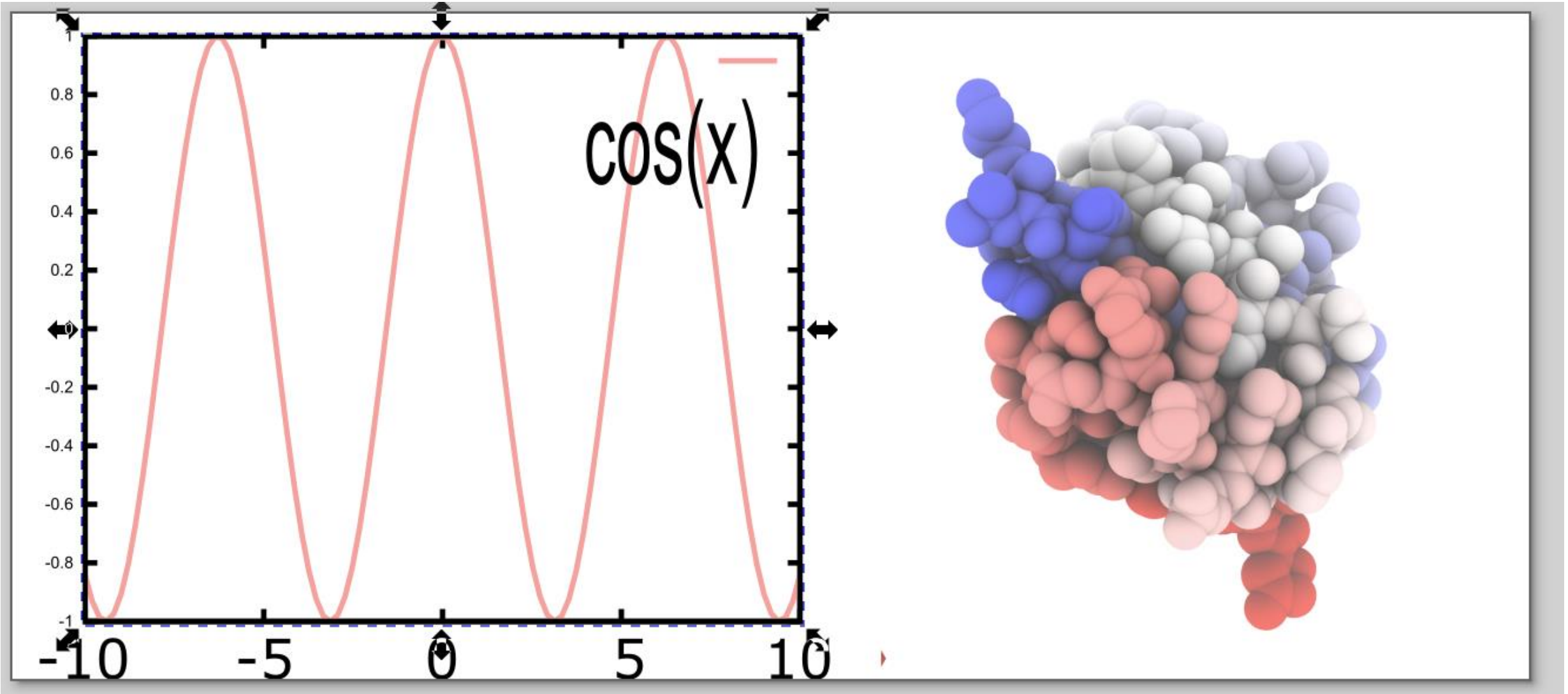


We want to set the curve to be exactly the same color as part of our molecule

With the curve selected, click the eye drop symbol

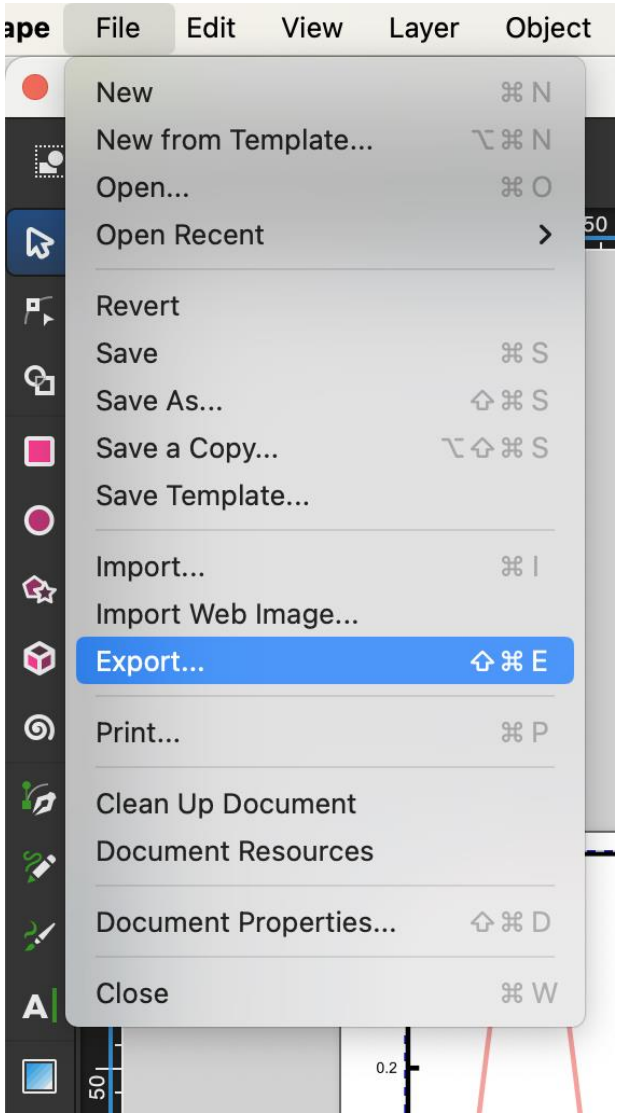
Click something and the curve will become that color

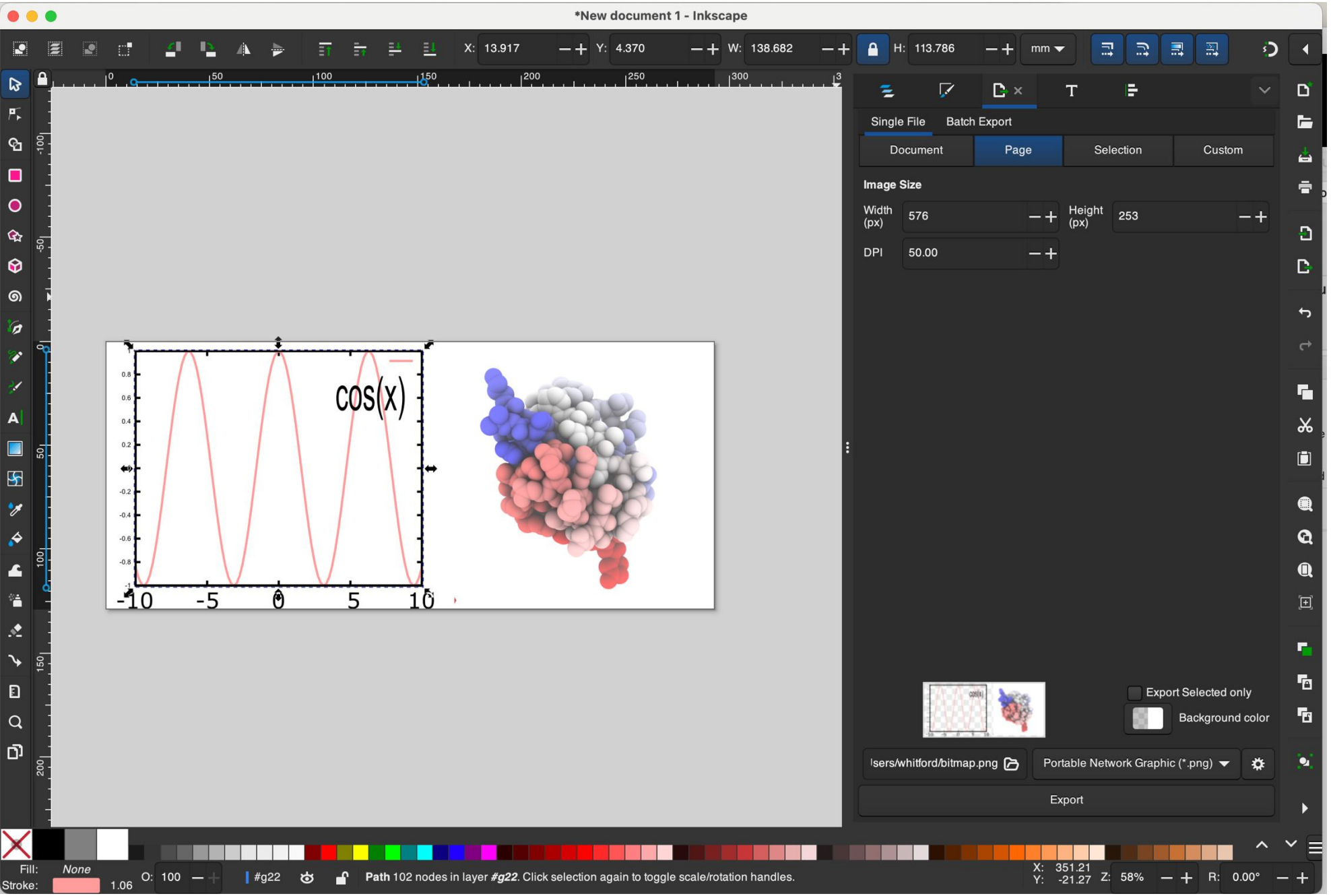




This ability to choose colors is particularly useful when adding labels to a complex molecular system.

Create a bitmap to be submitted





In the export panel, indicate the type of bitmap you want to export, the resolution/size, file name, etc.

Hit “Export”

Good luck!

Be creative.

If you can think of something you want to do, someone probably has a Youtube video showing exactly how to do it.