PGFPLOTS Cheat Sheet for Calculus-type graphs

Addplot

```
\addplot coordinates {⟨coordinate list⟩};
\addplot table [⟨column selection⟩]{⟨table⟩};
\addplot {⟨math expression⟩};
\addplot[variable = t] ( {⟨math⟩}, {⟨math⟩} );
```

Coordinate list example:
```
{(1,2) (10,12) (25,30)}
```

Inline table example
```
{
1 1
2 4
3 9
}; %  must be by itself on last line
```

Math expression example
```
\addplot{e^{-x^2}};
```

Coordinates

Cartesian coordinates
```
(length1,length2)
```

Polar coordinates
```
(angle:length)
```

Coordinate math expression examples:
```
(pi/2, {sin(pi/2)})   or   (1e6, 2e7)
```

Options for `axis`

Box, *x*-axis, *y*-axis, etc
```
axis lines=box|left|middle|center|right|none
axis x line=box|top|middle|center|bottom|none
axis y line=box|left|middle|center|right|none
```

Labels
```
xlabel = ⟨text⟩, ylabel = ⟨text⟩
```

Title
```
title = ⟨text⟩
```

Ticks
```
ticks = minor|major|both|none
xtick = \empty|⟨number list⟩
ytick = \empty|⟨number list⟩
xtick distance = ⟨dim⟩ % dist between ticks
ytick distance = ⟨dim⟩
minor tick num = ⟨num⟩ % ticks between ticks
xticklabels=⟨text list⟩
yticklabels=⟨text list⟩
```
(WARNING: `xticklabel` is an unrelated command)

Grids
```
grid=minor|major|both|none
```

Ticklabel scale format
```
tick scale binop=⟨binary operator⟩
```

Axis external sizing options

Size styles

`normalsize` :	8.4 cm × 7.3 cm	= 3.3 in × 2.9 in
`small` :	6.50 cm × 5.60 cm	= 2.52 in × 2.20 in
`footnotesize` :	5 cm × 4.31 cm	= 1.97 in × 1.70 in
`tiny` :	4 cm × 3.45 cm	= 1.57 in × 1.36 in

Setting width and height
```
\begin{axis}[width=⟨dim⟩, height = ⟨dim⟩]
```

Scaling whole image
```
\begin{tikzpicture}[scale=1.25] % visual mag
\begin{axis}[scale=1.25] % logical mag
```

Changing external aspect ratio
```
\begin{axis}[y post scale=2] % change height
\begin{axis}[height=9cm]  % change height
```

Clipping
```
clip = true|false
clip mode = global|individual
restrict y to domain = ⟨min⟩:⟨max⟩
```

Axis internal sizing options

Setting internal limits
```
xmin = ⟨number⟩, xmax = ⟨number⟩,
ymin = ⟨number⟩, ymin = ⟨number⟩
```

Changing internal aspect ratio
```
\begin{axis}[axis equal]
\begin{axis}[unit vector ratio = ⟨num⟩ ⟨num⟩]
```

Options for Addplot (mostly from Tikz)

Line thickness:
```
ultra thin|very thin|thin|semithick|thick
    |very thick|ultra thick|linewidth=⟨dim⟩
```

Line style:
```
solid|dashed|dotted|dash dot|dash dot dot
    |densely dashed|loosely dashed|⟨etc⟩
```

Color Example:
```
red!50!black,ultra thick
```

Line doubling example
```
double=white,thick
```

Line shape
```
sharp|smooth
```

Where functions are evaluated
```
domain = ⟨min⟩:⟨max⟩
samples = ⟨whole number⟩ % num of values used
samples at = {⟨numbers⟩} % manual override
```

Marks
```
only marks % don't connect points
marks = none
mark = *|+|x|o|star|square|oplus|diamond|⟨etc⟩
mark size = ⟨dim⟩
mark indices = {⟨index list⟩} % which points
mark options = {⟨style declarations⟩}
```

Style declarations example
```
mark options = {scale=2,thick,fill=white}
```

Math options

Setting trig functions in plot commands to use radians
```
trig format plots = rad
```

Defining constant and function example:
```
declare function = { a = 5; % <- semicolon!
f(\x) = (\x-a)^2; % <- semicolon!
}
```

Defining styles

Storing a style in a name
```
\pgfplotsset{duckplot/.style={thick,blue,smooth}}
\addplot[duckplot]{x^2};
```

Setting a style for whole document
```
\pgfplotsset{
   every axis/.style = {axis lines = middle},
   cycle list name = color list,
   every axis plot/.style = {thick,smooth}
   }
```

Externalize
```
\usetikzlibrary{external}
\tikzexternalize
\tikzsetexternalprefix{tikzfigs/}
\tikzsetnextfilename{3p5_example_1}
```

Command line
```
pdflatex -shell-escape mainfile
```
(Note: `mainfile` CANNOT have spaces in name)