

simple-plot

Typst Package

Mathematical Function Plotting

A lightweight library for creating elegant mathematical plots

Version 0.2.6

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1. Introduction

`simple-plot` is a Typst package for creating clean, elegant mathematical plots. Built on CeTZ, it provides an intuitive interface for plotting functions, data points, and creating publication-ready graphs.

1.1. Features

- Plot mathematical functions with automatic sampling
- Scatter plots and line plots with customizable markers
- Clean integer-based tick system by default
- Major and minor grid with elegant styling
- White box masking for tick labels (grid-label-break)
- Automatic axis extension beyond grid
- Flexible axis positioning (origin, bottom/left, custom)
- Multiple label display options (unit-label-only, label-step)
- Function labels with flexible positioning
- Clipping for clean rendering at boundaries

1.2. Installation

Import the package in your Typst document:

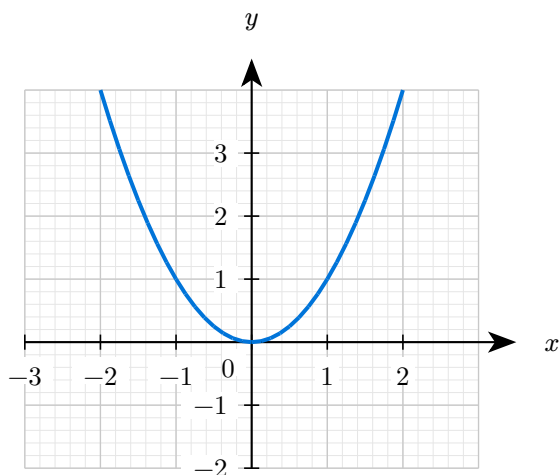
```
#import "@local/simple-plot:0.2.6": plot
```

1.3. Quick Start

Code

```
#plot(  
  width: 6, height: 5,  
  xmin: -3, xmax: 3, ymin: -2, ymax: 4,  
  xlabel:  $x$ , ylabel:  $y$ ,  
  show-grid: true,  
  (fn: x => x * x, stroke: blue + 1.5pt),  
)
```

Preview



2. Basic Usage

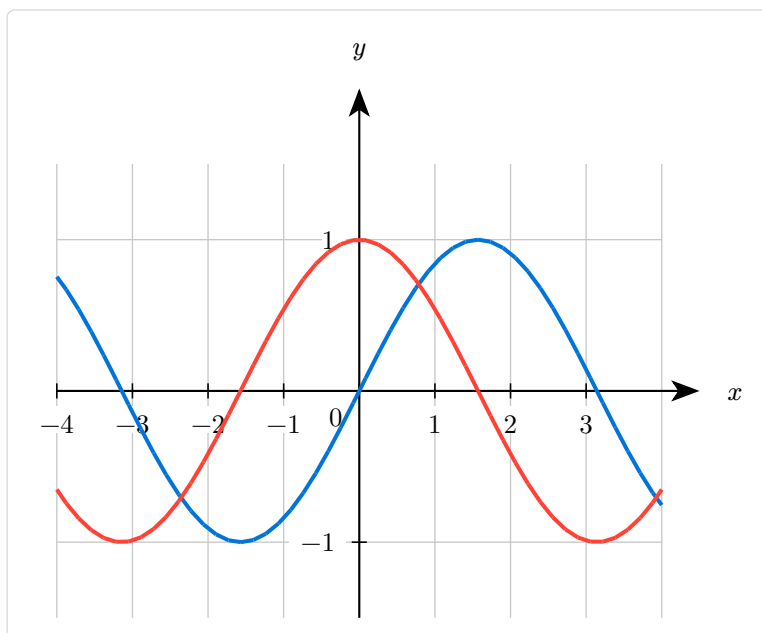
2.1. Plotting Functions

Plot mathematical functions by passing a dictionary with `fn`:

Code

```
#plot(  
  width: 8, height: 6,  
  xmin: -4, xmax: 4, ymin: -1.5, ymax: 1.5,  
  xlabel:  $x$ , ylabel:  $y$ ,  
  show-grid: "major",  
  (fn: x => calc.sin(x), stroke: blue + 1.5pt),  
  (fn: x => calc.cos(x), stroke: red + 1.5pt),  
)
```

Preview



2.2. Mathematical Functions Reference

Functions are defined using Typst's `calc` module. Here are the most common mathematical functions:

Function	Typst syntax
Power x^n	<code>calc.pow(x, n)</code>
Square root \sqrt{x}	<code>calc.sqrt(x)</code>
Absolute value $ x $	<code>calc.abs(x)</code>
Sine $\sin(x)$	<code>calc.sin(x)</code>
Cosine $\cos(x)$	<code>calc.cos(x)</code>
Tangent $\tan(x)$	<code>calc.tan(x)</code>
Exponential e^x	<code>calc.exp(x)</code>
Natural log $\ln(x)$	<code>calc.ln(x)</code>
Log base b	<code>calc.log(x, base: b)</code>
Maximum	<code>calc.max(a, b)</code>
Minimum	<code>calc.min(a, b)</code>

Important: When using constants in calculations, use decimal notation (e.g., 2.0 instead of 2) to avoid type errors. For example:

- ✓ $x \Rightarrow x * x / 2.0$
- ✗ $x \Rightarrow x * x / 2$ (*may cause errors*)

This is because Typst's type system requires consistent float arithmetic.

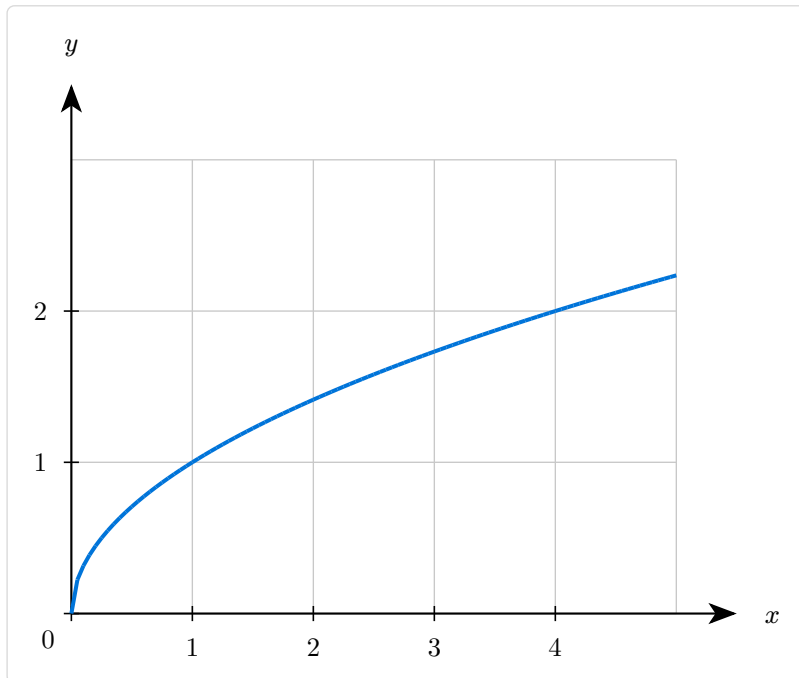
2.3. Function Domain

Specify a custom domain for functions:

Code

```
#plot(  
  width: 8, height: 6,  
  xmin: 0, xmax: 5, ymin: 0, ymax: 3,  
  xlabel:  $x$ , ylabel:  $y$ ,  
  axis-x-pos: "bottom", axis-y-pos: "left",  
  show-grid: "major",  
  (fn: x => calc.sqrt(x), domain: (0, 5), stroke: blue + 1.5pt),  
)
```

Preview



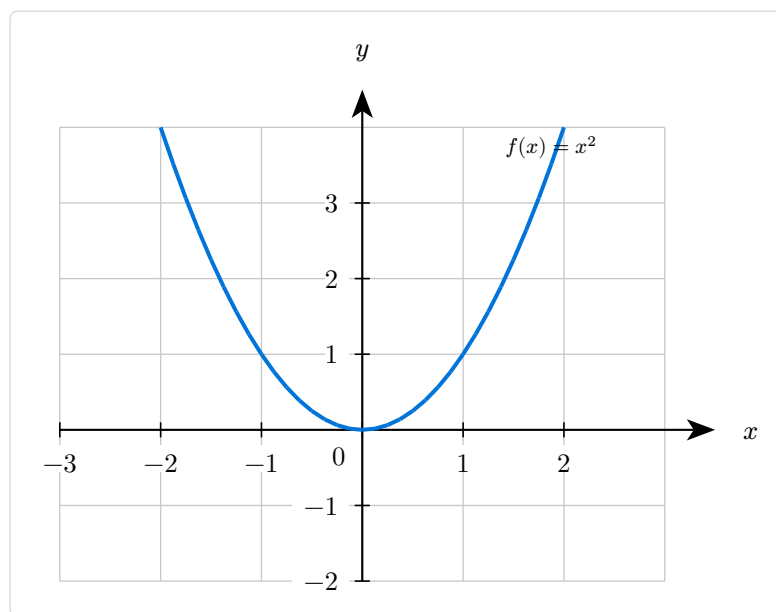
2.4. Function Labels

Add labels to your functions:

Code

```
#plot(  
  width: 8, height: 6,  
  xmin: -3, xmax: 3, ymin: -2, ymax: 4,  
  xlabel: $x$, ylabel: $y$,  
  show-grid: "major",  
  (  
    fn: x => x * x,  
    stroke: blue + 1.5pt,  
    label: $f(x) = x^2$,  
    label-side: "above",  
    label-pos: 0.75,  
  ),  
)
```

Preview



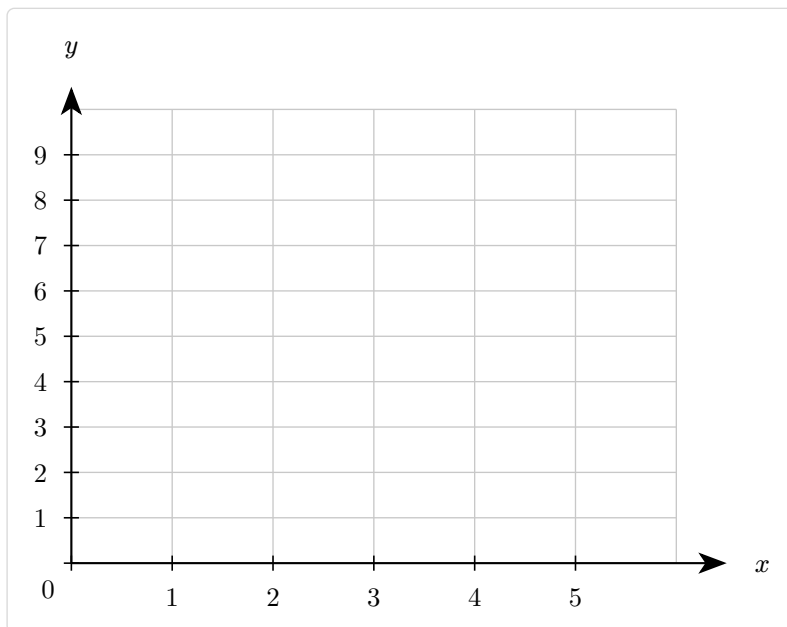
2.5. Data Points and Scatter Plots

Plot discrete data points:

Code

```
#plot(  
  width: 8, height: 6,  
  xmin: 0, xmax: 6, ymin: 0, ymax: 10,  
  xlabel:  $x$ , ylabel:  $y$ ,  
  axis-x-pos: "bottom", axis-y-pos: "left",  
  show-grid: "major",  
  (  
    data: ((1, 2), (2, 4), (3, 5), (4, 7), (5, 9)),  
    mark: "o",  
    mark-size: 0.15,  
    stroke: blue + 1pt,  
  ),  
)
```

Preview



3. Grid Options

3.1. Grid Modes

Control grid display with `show-grid`:

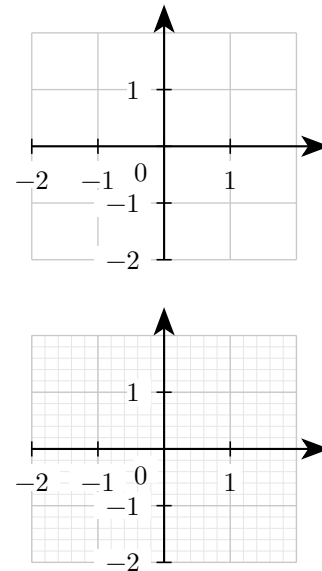
Code

```
// Major grid only
#plot(
  width: 5, height: 4,
  xmin: -2, xmax: 2, ymin: -2, ymax: 2,
  show-grid: "major",
)

// Minor grid only
#plot(
  width: 5, height: 4,
  xmin: -2, xmax: 2, ymin: -2, ymax: 2,
  show-grid: "minor",
)

// Both grids
#plot(
  width: 5, height: 4,
  xmin: -2, xmax: 2, ymin: -2, ymax: 2,
  show-grid: "both",
)
```

Preview



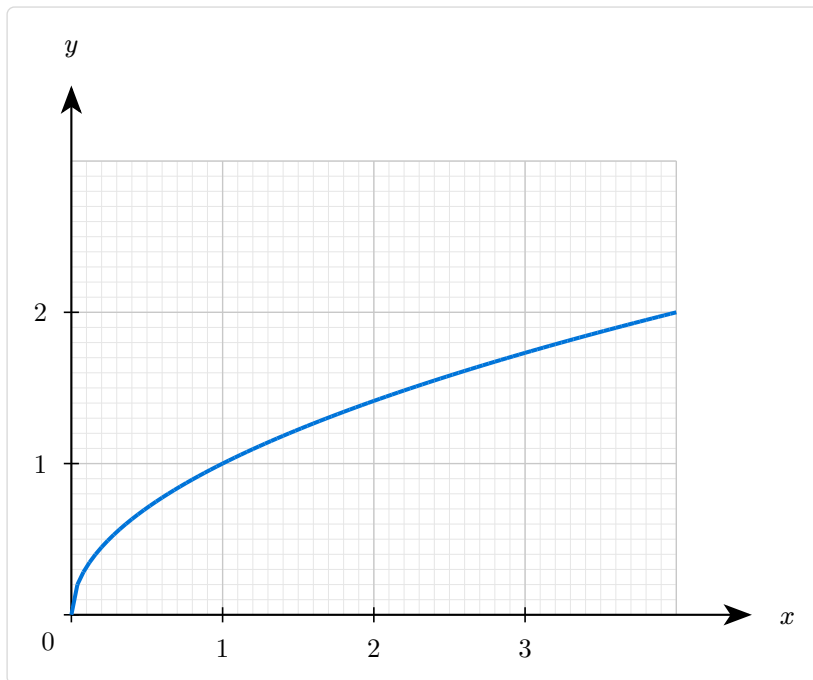
3.2. Minor Grid Subdivisions

Control the number of subdivisions with `minor-grid-step`:

Code

```
#plot(  
  width: 8, height: 6,  
  xmin: 0, xmax: 4, ymin: 0, ymax: 3,  
  xlabel:  $x$ , ylabel:  $y$ ,  
  axis-x-pos: "bottom", axis-y-pos: "left",  
  show-grid: "both",  
  minor-grid-step: 10, // 10 subdivisions per unit  
  (fn: x => calc.sqrt(x), domain: (0, 4), stroke: blue + 1.5pt),  
)
```

Preview



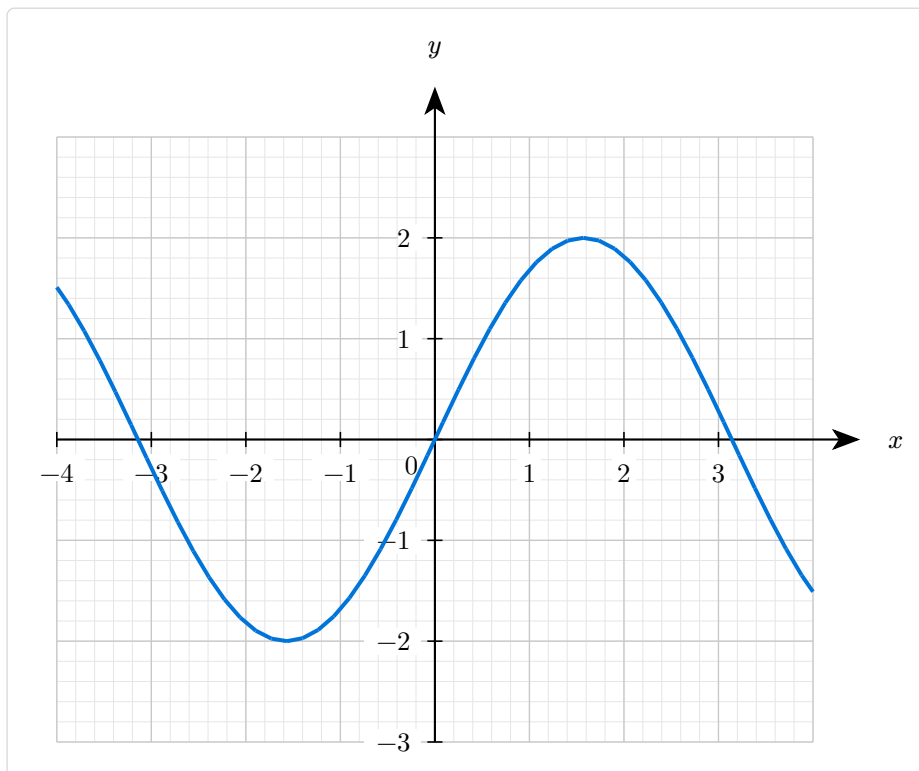
3.3. Grid Label Break

The `grid-label-break` option (enabled by default) draws white boxes behind tick labels, creating an elegant effect where grid lines appear to stop at the labels:

Code

```
#plot(  
  width: 10, height: 8,  
  xmin: -4, xmax: 4, ymin: -3, ymax: 3,  
  xlabel:  $x$ , ylabel:  $y$ ,  
  show-grid: "both",  
  minor-grid-step: 5,  
  grid-label-break: true, // Default  
  (fn: x => calc.sin(x) * 2, stroke: blue + 1.5pt),  
)
```

Preview



4. Axis Configuration

4.1. Axis Position

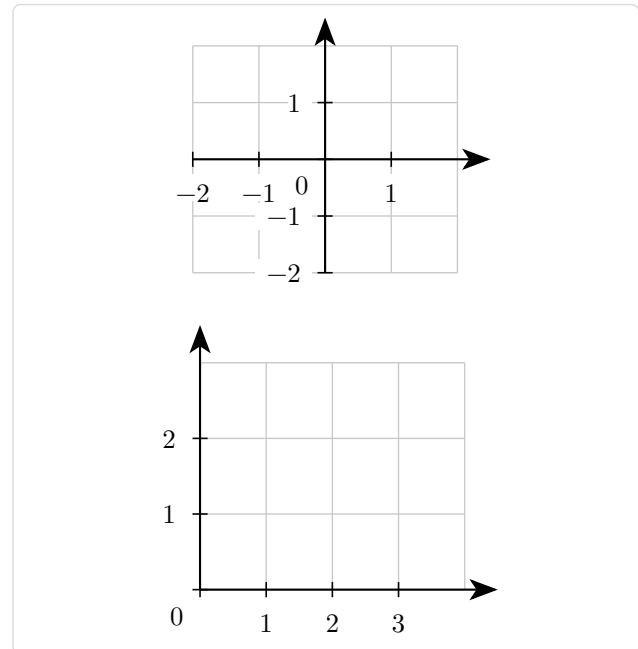
Position axes at origin (default), bottom/left, or custom values:

Code

```
// Through origin (default)
#plot(
  width: 5, height: 4,
  xmin: -2, xmax: 2, ymin: -2, ymax: 2,
  show-grid: "major",
)

// Bottom and left
#plot(
  width: 5, height: 4,
  xmin: 0, xmax: 4, ymin: 0, ymax: 3,
  axis-x-pos: "bottom",
  axis-y-pos: "left",
  show-grid: "major",
)
```

Preview



4.2. Axis Extension

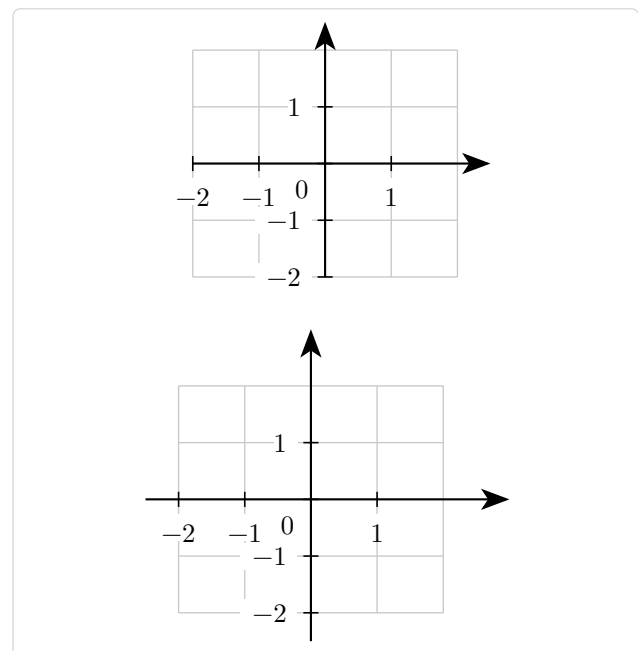
By default, axes extend 0.5 units beyond the grid on the arrow side. Customize with `axis-x-extend` and `axis-y-extend`:

Code

```
// Default extension (0, 0.5)
#plot(
  width: 5, height: 4,
  xmin: -2, xmax: 2, ymin: -2, ymax: 2,
  show-grid: "major",
)

// Custom extension
#plot(
  width: 5, height: 4,
  xmin: -2, xmax: 2, ymin: -2, ymax: 2,
  axis-x-extend: (0.5, 1),
  axis-y-extend: (0.5, 1),
  show-grid: "major",
)
```

Preview



5. Tick Configuration

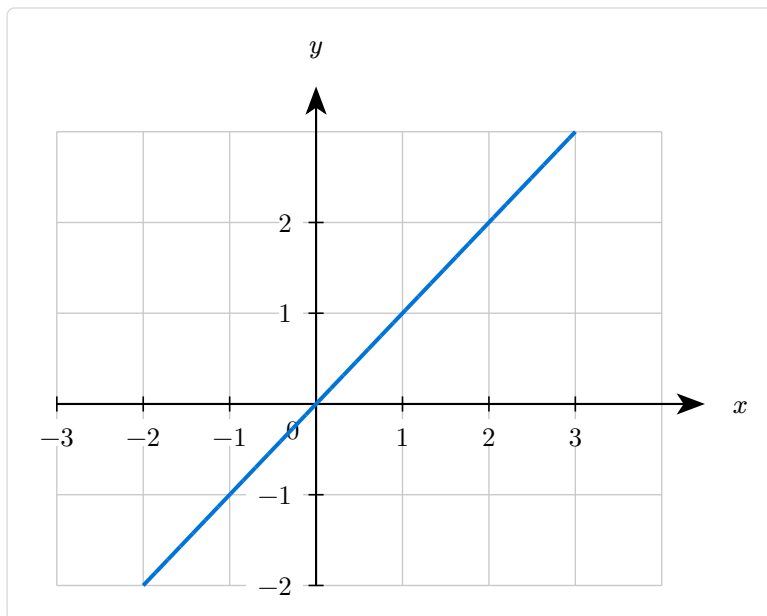
5.1. Default Integer Ticks

By default, ticks are placed at every integer (step = 1):

Code

```
#plot(  
  width: 8, height: 6,  
  xmin: -3, xmax: 4, ymin: -2, ymax: 3,  
  xlabel:  $x$ , ylabel:  $y$ ,  
  show-grid: "major",  
  (fn: x => x, stroke: blue + 1.5pt),  
)
```

Preview



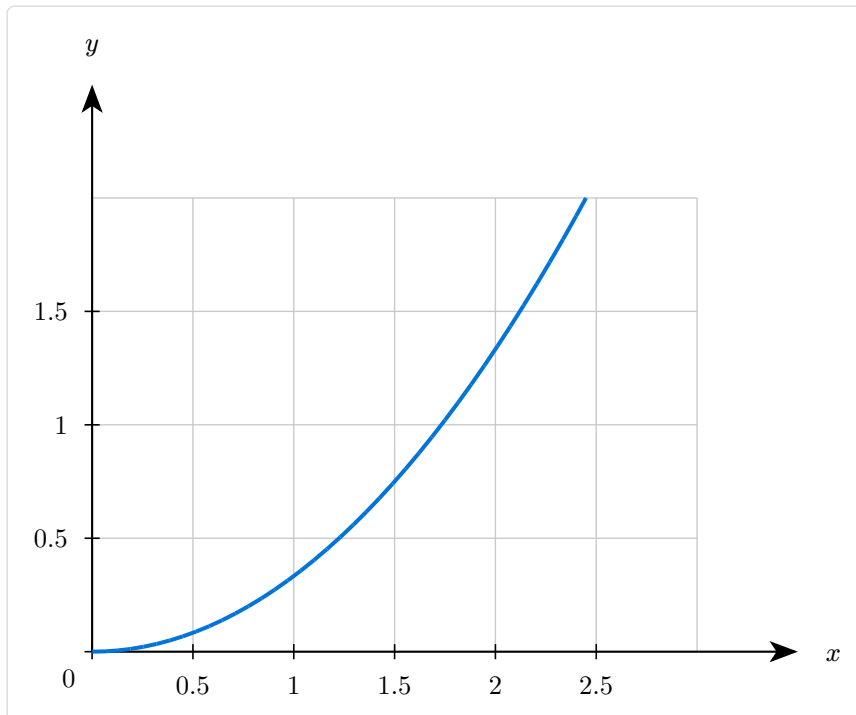
5.2. Custom Tick Step

Change tick spacing with `xtick-step` and `ytick-step`:

Code

```
#plot(  
  width: 8, height: 6,  
  xmin: 0, xmax: 3, ymin: 0, ymax: 2,  
  xlabel:  $x$ , ylabel:  $y$ ,  
  axis-x-pos: "bottom", axis-y-pos: "left",  
  xtick-step: 0.5,  
  ytick-step: 0.5,  
  show-grid: "major",  
  (fn: x => x * x / 3, stroke: blue + 1.5pt),  
)
```

Preview



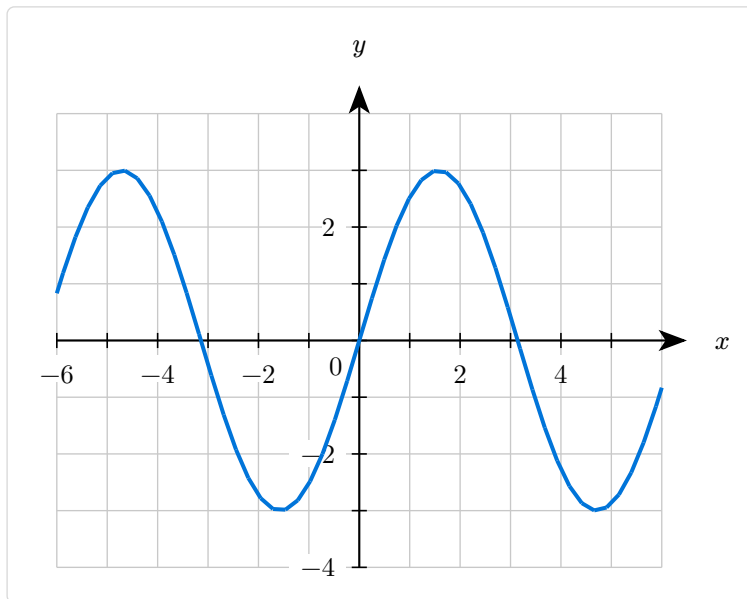
5.3. Tick Label Step

Show labels only at every N-th tick with `xtick-label-step` and `ytick-label-step`:

Code

```
#plot(
  width: 8, height: 6,
  xmin: -6, xmax: 6, ymin: -4, ymax: 4,
  xlabel: $x$, ylabel: $y$,
  xtick-label-step: 2, // Labels at -6, -4, -2, 2, 4, 6
  ytick-label-step: 2, // Labels at -4, -2, 2, 4
  show-grid: "major",
  (fn: x => calc.sin(x) * 3, stroke: blue + 1.5pt),
)
```

Preview



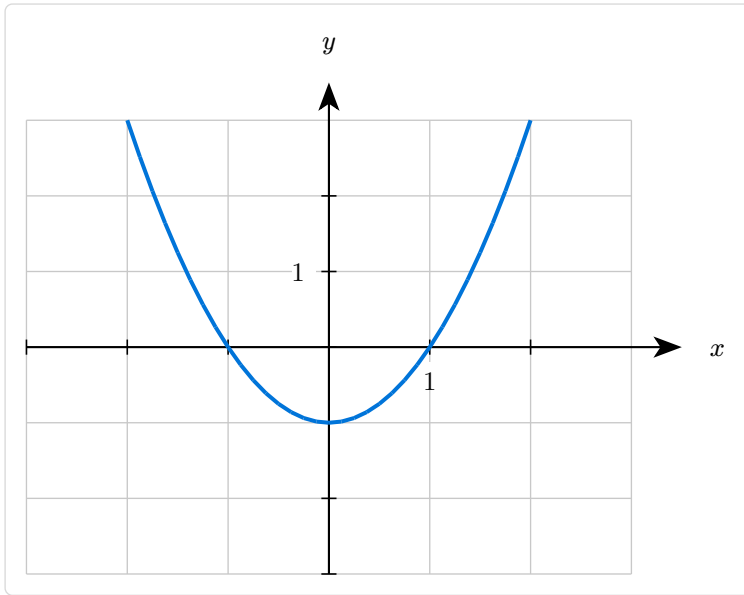
5.4. Unit Label Only

Show only “1” on each axis for a minimal style:

Code

```
#plot(  
  width: 8, height: 6,  
  xmin: -3, xmax: 3, ymin: -3, ymax: 3,  
  xlabel:  $x$ , ylabel:  $y$ ,  
  unit-label-only: true,  
  show-origin: false,  
  show-grid: "major",  
  (fn: x => x * x - 1, stroke: blue + 1.5pt),  
)
```

Preview



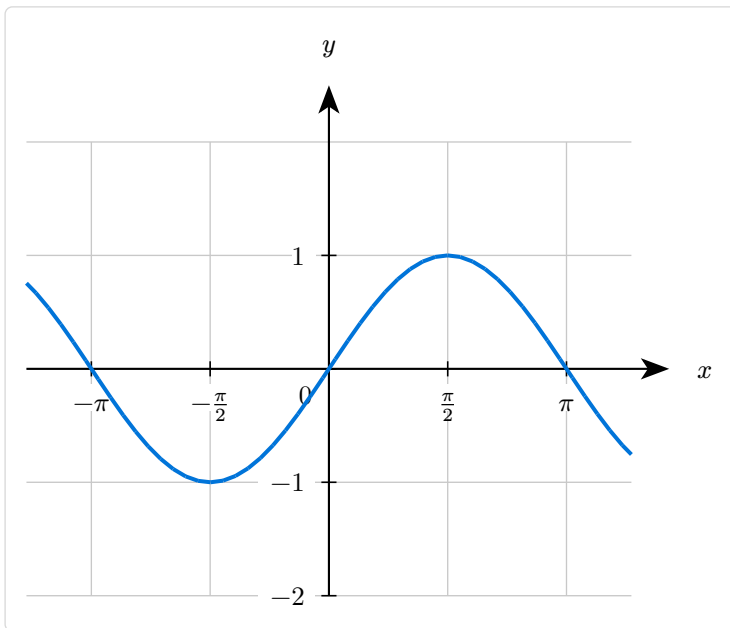
5.5. Custom Tick Positions

Specify exact tick positions with `xtick` and `ytick`:

Code

```
#plot(
  width: 8, height: 6,
  xmin: -4, xmax: 4, ymin: -2, ymax: 2,
  xlabel:  $x$ , ylabel:  $y$ ,
  xtick: (-calc.pi, -calc.pi/2, 0, calc.pi/2, calc.pi),
  xtick-labels: ( $-\pi$ ,  $-\pi/2$ ,  $0$ ,  $\pi/2$ ,  $\pi$ ),
  show-grid: "major",
  (fn: x => calc.sin(x), stroke: blue + 1.5pt),
)
```

Preview



5.6. Hide Origin Label

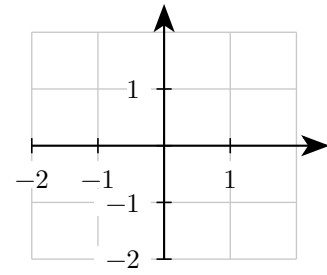
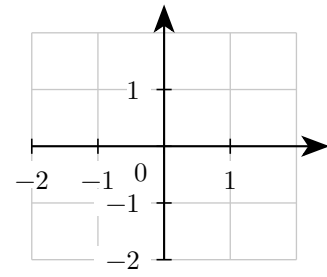
Control the “0” label at the origin:

Code

```
// With origin (default)
#plot(
  width: 5, height: 4,
  xmin: -2, xmax: 2, ymin: -2, ymax: 2,
  show-origin: true,
  show-grid: "major",
)

// Without origin
#plot(
  width: 5, height: 4,
  xmin: -2, xmax: 2, ymin: -2, ymax: 2,
  show-origin: false,
  show-grid: "major",
)
```

Preview



6. Markers

6.1. Available Marker Types

The following markers are available:

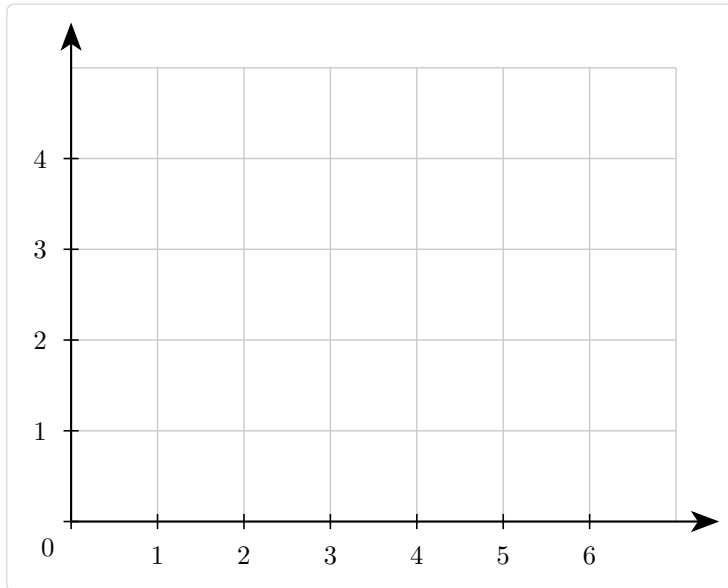
Marker	Description
"o"	Circle (outline)
"*"	Circle (filled)
"square" / "s"	Square (outline)
"square*"	Square (filled)
"triangle" / "^"	Triangle up (outline)
"triangle*"	Triangle up (filled)
"diamond" / "d"	Diamond (outline)
"diamond*"	Diamond (filled)
"star"	Star (outline)
"star*"	Star (filled)
"+"	Plus sign
"x"	Cross
" "	Vertical bar
"_"	Horizontal bar

6.2. Using Markers

Code

```
#plot(  
  width: 8, height: 6,  
  xmin: 0, xmax: 7, ymin: 0, ymax: 5,  
  axis-x-pos: "bottom", axis-y-pos: "left",  
  show-grid: "major",  
  (data: ((1, 1), (2, 2), (3, 2.5))), mark: "o", stroke: blue),  
  (data: ((1, 2), (2, 3), (3, 3.5))), mark: "square*", stroke: red),  
  (data: ((1, 3), (2, 4), (3, 4.2))), mark: "triangle", stroke: green),  
)
```

Preview



7. Convenience Functions

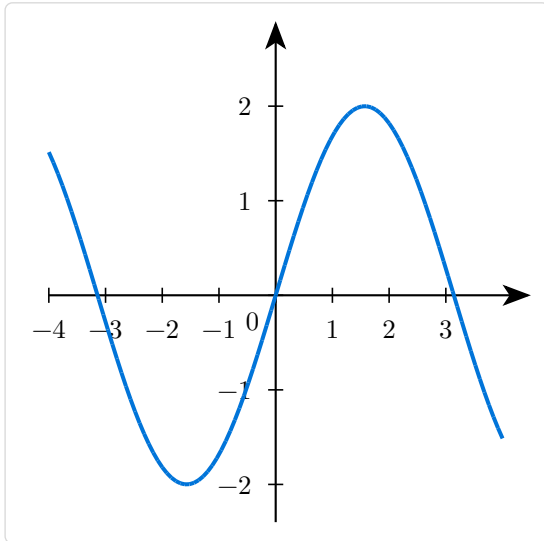
7.1. plot-fn - Quick Function Plot

Plot a single function with automatic y-scaling:

Code

```
#plot-fn(  
  x => calc.sin(x) * 2.0,  
  domain: (-4, 4),  
  stroke: blue + 1.5pt,  
)
```

Preview



7.2. scatter - Scatter Plot Helper

Create scatter plot specifications:

```
#let my-data = scatter(  
  ((1, 2), (2, 4), (3, 5)),  
  mark: "o",  
  stroke: blue,  
)  
#plot(xmin: 0, xmax: 4, ymin: 0, ymax: 6, my-data)
```

7.3. line-plot - Line Plot Helper

Create connected line plots:

```
#let my-line = line-plot(  
  ((1, 2), (2, 4), (3, 5)),  
  stroke: blue + 1pt,  
  mark: "o",  
)  
#plot(xmin: 0, xmax: 4, ymin: 0, ymax: 6, my-line)
```

7.4. func-plot - Function Plot Helper

Create function plot specifications:

```
#let my-func = func-plot(  
  x => calc.sin(x),
```

```
stroke: blue + 1.5pt,  
label:  $\sin(x)$ ,  
)  
#plot(xmin: -4, xmax: 4, ymin: -1.5, ymax: 1.5, my-func)
```

8. Global Configuration

8.1. Setting Defaults

Use `set-plot-defaults` to configure defaults for all subsequent plots:

```
#set-plot-defaults(  
  width: 8,  
  height: 6,  
  show-grid: "both",  
  minor-grid-step: 5,  
)  
  
// All plots will now use these defaults  
#plot(xmin: -3, xmax: 3, ymin: -2, ymax: 2, ...)
```

8.2. Resetting Defaults

Reset to original defaults:

```
#reset-plot-defaults()
```

9. Styling

9.1. Custom Styles

Override default styles with the `style` parameter:

```
#plot(  
  xmin: -3, xmax: 3, ymin: -2, ymax: 2,  
  style: (  
    axis: (stroke: black + 1pt, arrow: "stealth"),  
    grid: (  
      major: (stroke: luma(180) + 0.6pt),  
      minor: (stroke: luma(220) + 0.3pt),  
    ),  
    ticks: (  
      length: 0.12,  
      stroke: black + 0.6pt,  
      label-size: 0.7em,  
    ),  
  ),  
  ...  
)
```

9.2. Default Style Values

Property	Default	Description
axis.stroke	black + 0.8pt	Axis line style
axis.arrow	"stealth"	Arrow head style
grid.major.stroke	luma(200) + 0.5pt	Major grid line style
grid.minor.stroke	luma(230) + 0.3pt	Minor grid line style
ticks.length	0.1	Tick mark length (cm)
ticks.stroke	black + 0.6pt	Tick mark style
ticks.label-size	0.65em	Tick label font size
ticks.label-offset	0.15	Distance from tick to label
plot.stroke	blue + 1.2pt	Default function stroke
plot.samples	100	Default sample count
marker.size	0.12	Default marker size
labels.size	0.8em	Axis label font size

10. Parameter Reference

10.1. plot Function

Dimensions and Bounds:

Parameter	Type	Default	Description
width	float	6	Plot width in cm
height	float	6	Plot height in cm
scale	float	1	Scale factor for entire plot
xmin	float	auto	Minimum x value
xmax	float	auto	Maximum x value
ymin	float	auto	Minimum y value
ymax	float	auto	Maximum y value

Axis Configuration:

Parameter	Type	Default	Description
xlabel	content	none	X-axis label
ylabel	content	none	Y-axis label
xlabel-pos	string/array	“end”	“end”, “center”, or (x, y)
ylabel-pos	string/array	“end”	“end”, “center”, or (x, y)
xlabel-anchor	string	“west”	Anchor for x label
ylabel-anchor	string	“south”	Anchor for y label
xlabel-offset	array	(0.3, 0)	X label offset (cm)
ylabel-offset	array	(0, 0.3)	Y label offset (cm)
axis-x-pos	string/float	0	“bottom”, “center”, or y-value
axis-y-pos	string/float	0	“left”, “center”, or x-value
axis-x-extend	float/array	(0, 0.5)	X-axis extension (left, right)
axis-y-extend	float/array	(0, 0.5)	Y-axis extension (bottom, top)

Tick Configuration:

Parameter	Type	Default	Description
xtick	array/none	auto	Custom x tick positions
ytick	array/none	auto	Custom y tick positions
xtick-step	float	1	X tick spacing
ytick-step	float	1	Y tick spacing
xtick-labels	array/none	auto	Custom x tick labels
ytick-labels	array/none	auto	Custom y tick labels
xtick-label-step	int	1	Show x label every N ticks
ytick-label-step	int	1	Show y label every N ticks

show-origin	bool	true	Show “0” at origin
unit-label-only	bool	false	Show only “1” on axes
tick-label-size	length	0.65em	Tick label font size
axis-label-size	length	0.8em	Axis label font size

Grid Configuration:

Parameter	Type	Default	Description
show-grid	bool/string	false	true, false, “major”, “minor”, “both”
minor-grid-step	int	5	Subdivisions per major tick
grid-label-break	bool	true	White boxes behind labels

Styling:

Parameter	Type	Default	Description
style	dictionary	none	Style overrides

10.2. Function/Data Specification

Each plot item is a dictionary with these fields:

Field	Type	Description
fn	function	Function to plot: $x \Rightarrow y$
data	array	Data points: $((x_1, y_1), (x_2, y_2), \dots)$
domain	array	Function domain: (x_{\min}, x_{\max})
samples	int	Number of samples for function
stroke	stroke	Line style
mark	string	Marker type
mark-size	float	Marker size in cm
mark-fill	color	Marker fill color
label	content	Label text
label-pos	string	“above”, “below”, “left”, “right”
label-at	float/string	x-position or “start”/“end”/“center”
label-anchor	string	Text anchor point

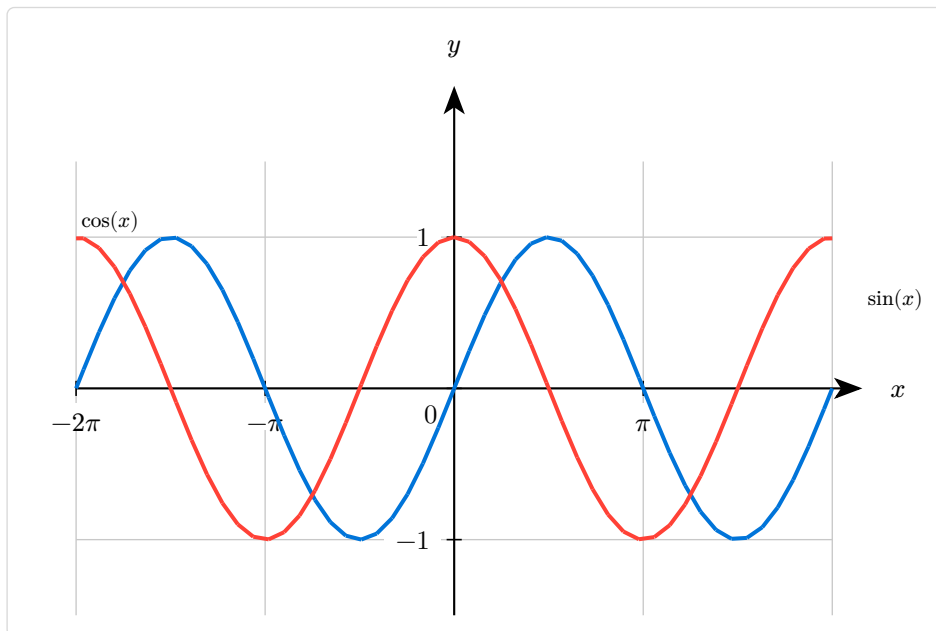
11. Complete Examples

11.1. Trigonometric Functions

Code

```
#plot(  
  width: 10, height: 6,  
  xmin: -2 * calc.pi, xmax: 2 * calc.pi,  
  ymin: -1.5, ymax: 1.5,  
  xlabel:  $x$ , ylabel:  $y$ ,  
  xtick: (-2*calc.pi, -calc.pi, 0, calc.pi, 2*calc.pi),  
  xtick-labels: ( $-2\pi$ ,  $-\pi$ ,  $0$ ,  $\pi$ ,  $2\pi$ ),  
  show-grid: "major",  
  (fn: x => calc.sin(x), stroke: blue + 1.5pt, label:  $\sin(x)$ , label-pos: 1),  
  (fn: x => calc.cos(x), stroke: red + 1.5pt, label:  $\cos(x)$ , label-pos: 0),  
)
```

Preview

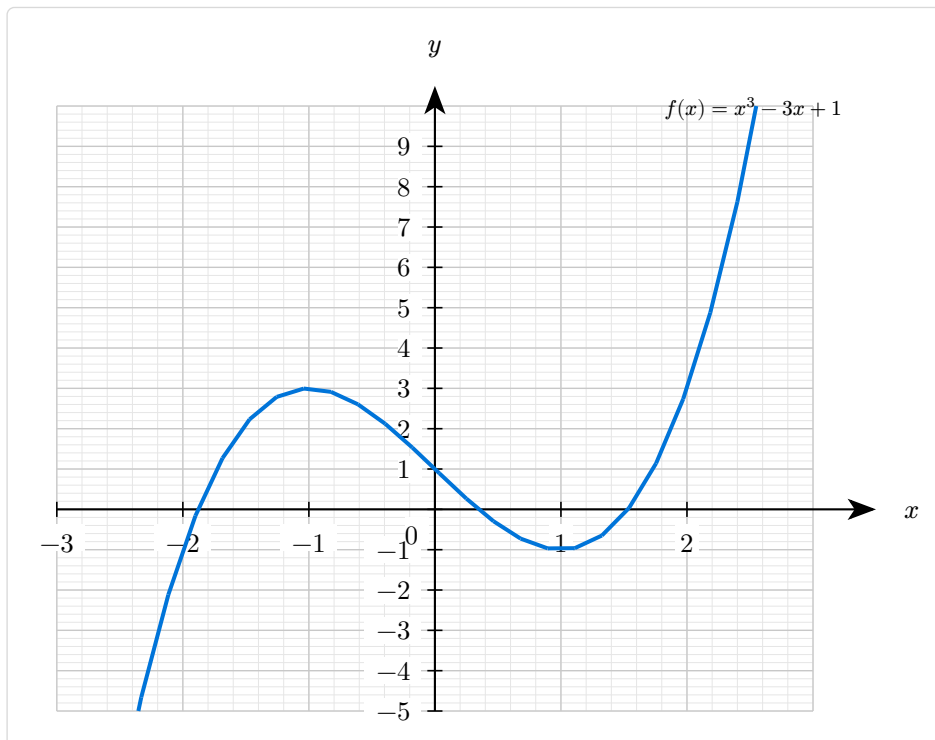


11.2. Polynomial with Fine Grid

Code

```
#plot(  
  width: 10, height: 8,  
  xmin: -3, xmax: 3, ymin: -5, ymax: 10,  
  xlabel: $x$, ylabel: $y$,  
  show-grid: "both",  
  minor-grid-step: 5,  
  (  
    fn: x => x * x * x - 3 * x + 1,  
    stroke: blue + 1.5pt,  
    label: $f(x) = x^3 - 3x + 1$,  
    label-side: "above",  
    label-pos: 0.85,  
  ),  
)
```

Preview

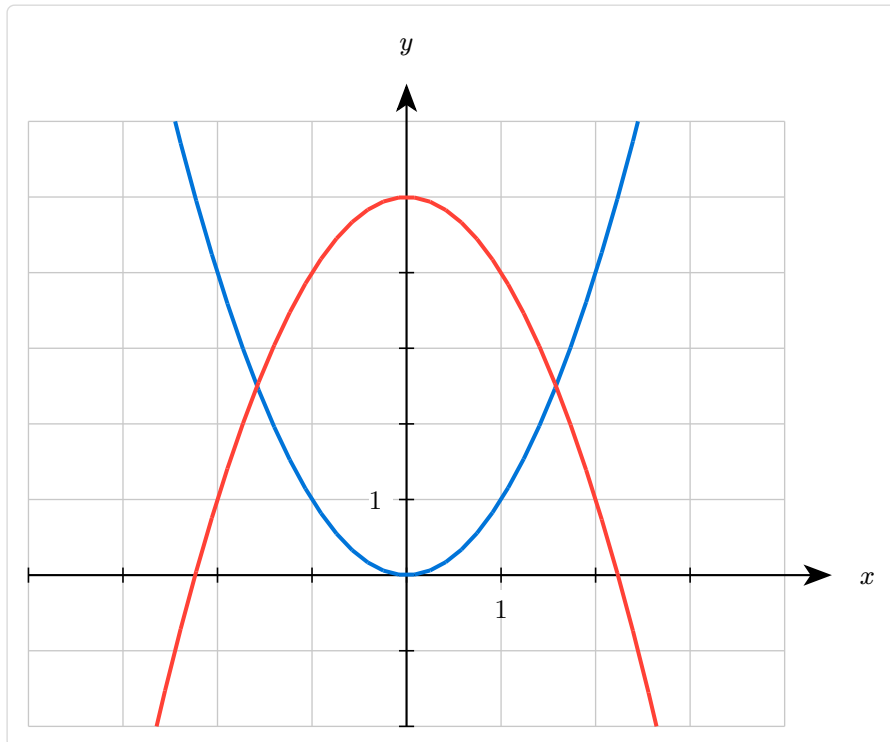


11.3. Minimal Style Plot

Code

```
#plot(  
  width: 10, height: 8,  
  xmin: -4, xmax: 4, ymin: -2, ymax: 6,  
  xlabel:  $x$ , ylabel:  $y$ ,  
  show-grid: "major",  
  unit-label-only: true,  
  show-origin: false,  
  (fn: x => x * x, stroke: blue + 1.5pt),  
  (fn: x => -x * x + 5, stroke: red + 1.5pt),  
)
```

Preview



11.4. Data with Trend Line

Code

```
#plot(
  width: 10, height: 7,
  xmin: 0, xmax: 6, ymin: 0, ymax: 12,
  xlabel: "Time (s)", ylabel: "Distance (m)",
  axis-x-pos: "bottom", axis-y-pos: "left",
  show-grid: "both",
  minor-grid-step: 5,
  (fn: x => 2 * x, stroke: gray + 1pt, domain: (0, 6)), // Trend line
  (
    data: ((0.5, 1.2), (1, 2.3), (2, 3.8), (3, 6.2), (4, 7.9), (5, 10.1)),
    mark: "o",
    mark-size: 0.12,
    stroke: none,
  ),
)
```

Preview

