Noteworthy Framework

Examples & *Documentation* (*Solutions*)

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NOTEWORTHY

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Preface

Welcome to the **Noteworthy Framework**. This document serves as both a demonstration of the framework's capabilities and a reference for its features.

1 About Noteworthy

Noteworthy is a modular framework for creating beautiful educational documents in Typst. It provides a comprehensive set of tools for:

- **Structured Layouts**: Automated chapters, sections, and covers.
- **Themed Components**: Pre-styled blocks for definitions, theorems, examples, and more.
- **Advanced Plotting**: Integrated 2D and 3D plotting capabilities.
- **Customizable Themes**: A robust theming engine with multiple built-in presets.

2 Using This Guide

Each section of this document demonstrates a specific module of the framework. You can find the source code for these examples in the `content/` directory, which serves as a practical reference for your own documents.

Sihoo Lee & *Lee Hojun*
Noteworthy

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Chapter 00

Getting Started

Introduction to Noteworthy basics.

Chapter 00.01

Welcome

1 Welcome to Noteworthy

Noteworthy is a powerful Typst template for creating beautiful educational documents with rich content blocks and visualization tools.

1.1 What You'll Learn

This guide covers all Noteworthy-specific features:

Definition | Content Blocks

Semantic containers for definitions, theorems, proofs, examples, solutions, and more.

Note | Canvas System

A unified object-oriented plotting system for 2D geometry, vectors, polar plots, and 3D space.

Chapter 00.02

Quick Start

1 Quick Start Guide

Get started with Noteworthy in minutes.

1.1 Block Syntax Overview

All blocks follow the pattern: `#blockname("Title")[content]`

Definition | Definition Block

Use `#definition("Title")[...]` for definitions.

Theorem | Theorem Block

Use `#theorem("Title")[...]` for theorems.

Equation | Equation Block

Use `#equation("Title")[...]` for named equations:

$$E = mc^2$$

Note | Note Block

Use `#note("Title")[...]` for important notes.

Notation | Notation Block

Use `#notation("Title")[...]` to explain notation.

Analysis | Analysis Block

Use `#analysis("Title")[...]` for analysis and discussion.

Proof |

Use `#proof[...]` for proofs.

1.2 Proof & Solution Blocks

These blocks have special formatting:

Example | Example Block

Use `#example("Title")[...]` for examples.

Solution 1 |

Use `#solution[...]` for solutions. Visibility controlled by `show-solution` config.

Note |

Although not mandatory, solutions are suggested to be used inside of example blocks for clarity.

Chapter 01

Content Blocks

Semantic blocks for structuring educational content: definitions, theorems, proofs, examples, and solutions.

Chapter 01.01

Introduction

1 Content Blocks Overview

Noteworthy provides 9 semantic block types for structuring educational content.

1.1 The Block Types

1.1.1 Definition & Theorem

Definition | Limit

The limit of $f(x)$ as x approaches a is L if for every $\varepsilon > 0$ there exists $\delta > 0$ such that $|f(x) - L| < \varepsilon$ whenever $0 < |x - a| < \delta$.

Theorem | Squeeze Theorem

If $g(x) \leq f(x) \leq h(x)$ for all x near a, and $\lim_{x \to a} g(x) = \lim_{x \to a} h(x) = L$, then $\lim_{x \to a} f(x) = L$.

1.1.2 Equation & Notation

Equation | Euler's Identity

$$e^{i\pi} + 1 = 0$$

Notation | Big-O Notation

$O(n)$ denotes an upper bound on the growth rate of an algorithm.

1.1.3 Note & Analysis

Note | Remember

Limits describe behavior as we approach a point, not necessarily at the point itself.

Analysis | Convergence

The sequence $a_n = \frac{1}{n}$ converges to 0 because for any $\varepsilon > 0$, choosing $N > \frac{1}{\varepsilon}$ ensures $|a_n| < \varepsilon$ for all $n > N$.

Chapter 01.02

Content Blocks

1 Proofs & Solutions

Special blocks for mathematical reasoning and worked examples.

1.1 Proof Block

The `#proof` block automatically adds a QED symbol at the end.

Theorem | Sum of First n Integers

$$\sum_{k=1}^{n} k = \frac{n(n+1)}{2}$$

Proof |

Base case: When $n = 1$: $\sum_{k=1}^{1} k = 1 = \frac{1 \cdot 2}{2}$. ✓

Inductive step: Assume true for n. Then:

$$\sum_{k=1}^{n+1} k = \sum_{k=1}^{n} k + (n+1) = \frac{n(n+1)}{2} + (n+1)$$

$$= (n+1)\left(\frac{n}{2} + 1\right) = (n+1)\frac{n+2}{2}$$

Thus true for $n + 1$. ∴ By induction, the formula holds for all $n \geq 1$.

1.2 Example & Solution Blocks

Example | Derivative of x^3

Find $\frac{d}{dx} x^3$ using the power rule.

Solution 1 |

Using the power rule $\frac{d}{dx} x^n = n x^{n-1}$:

$$\frac{d}{dx} x^3 = 3x^2$$

Example | Integration

Evaluate $\int_0^2 x^2 \, \mathrm{d}x$.

Solution 1 |

$$\int_0^2 x^2 \, \mathrm{d}x = \left[\frac{x^3}{3}\right]_0^2 = \frac{8}{3} - 0 = \frac{8}{3}$$

Chapter 01.03

Layout Elements

1 Layout & Equations

Named equations and layout helpers.

1.1 Named Equations

Use `#equation` for important equations that deserve highlighting:

Equation | Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Equation | Maxwell's Equations

$$\nabla \cdot \boldsymbol{E} = \frac{\rho}{\varepsilon_0}$$
$$\nabla \cdot \boldsymbol{B} = 0$$
$$\nabla \times \boldsymbol{E} = -\partial \frac{\boldsymbol{B}}{\partial} t$$
$$\nabla \times \boldsymbol{B} = \mu_0 \boldsymbol{J} + \mu_0 \varepsilon_0 \partial \frac{\boldsymbol{E}}{\partial} t$$

Equation | Schrödinger Equation

$$i\hbar \frac{\partial}{\partial t} \Psi = \hat{H} \Psi$$

1.2 Combining Blocks

Blocks work naturally together:

Definition | Eigenvalue

A scalar λ is an eigenvalue of matrix $\boldsymbol{A}$ if $\boldsymbol{A}\boldsymbol{v} = \lambda \boldsymbol{v}$ for some non-zero vector $\boldsymbol{v}$.

Equation | Characteristic Equation

$$\det(\boldsymbol{A} - \lambda \boldsymbol{I}) = 0$$

Example | 2×2 Eigenvalues

Find eigenvalues of $\begin{pmatrix} 3 & 1 \\ 0 & 2 \end{pmatrix}$.

Solution 1 |

$$\det\begin{pmatrix} 3-\lambda & 1 \\ 0 & 2-\lambda \end{pmatrix} = (3-\lambda)(2-\lambda) = 0$$

Thus $\lambda = 3$ or $\lambda = 2$.

Chapter 02

Geometry & Visualization

Powerful plotting system for Euclidean geometry, vectors, and 3D space.

Chapter 02.01

Introduction

1 Canvas System Overview

The Noteworthy canvas system provides unified object-oriented plotting.

1.1 Canvas Types

Noteworthy provides four canvas types:

Definition | cartesian-canvas

Standard 2D Cartesian coordinate system with axes,grids, and labels.

Definition | blank-canvas

Canvas without axes - useful for diagrams and geometric constructions.

Definition | polar-canvas

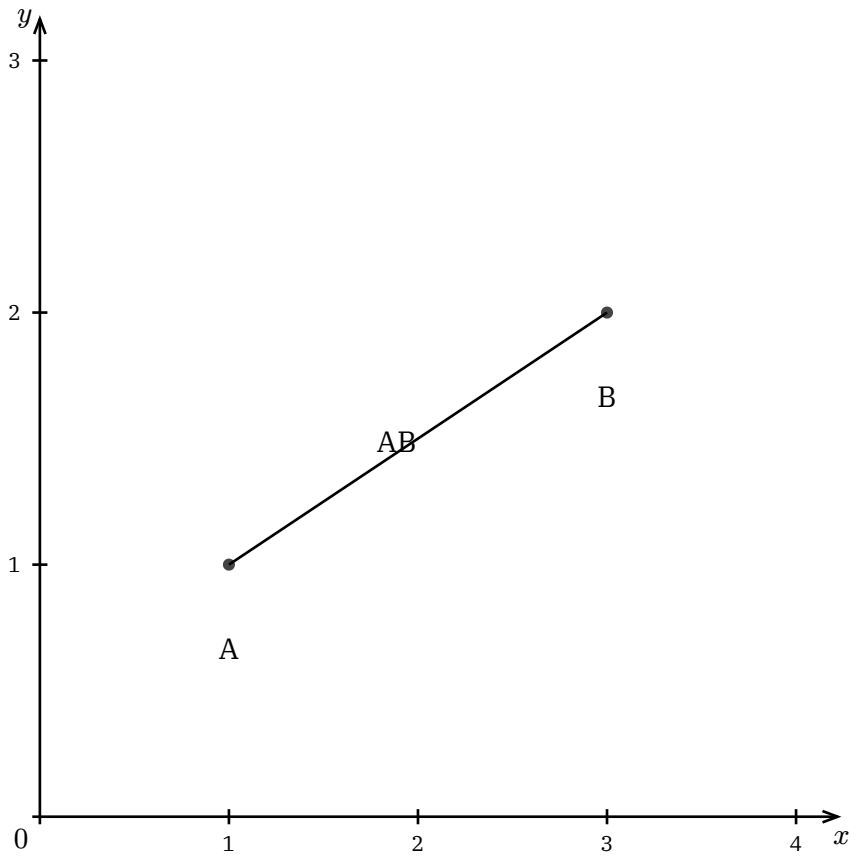
Polar coordinate system for circular plots.

Definition | space-canvas

3D coordinate system with perspective projection.

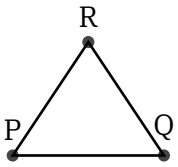
1.2 Basic Example

A simple Cartesian canvas with a point and line:



1.3 Blank Canvas

For diagrams without coordinate axes:



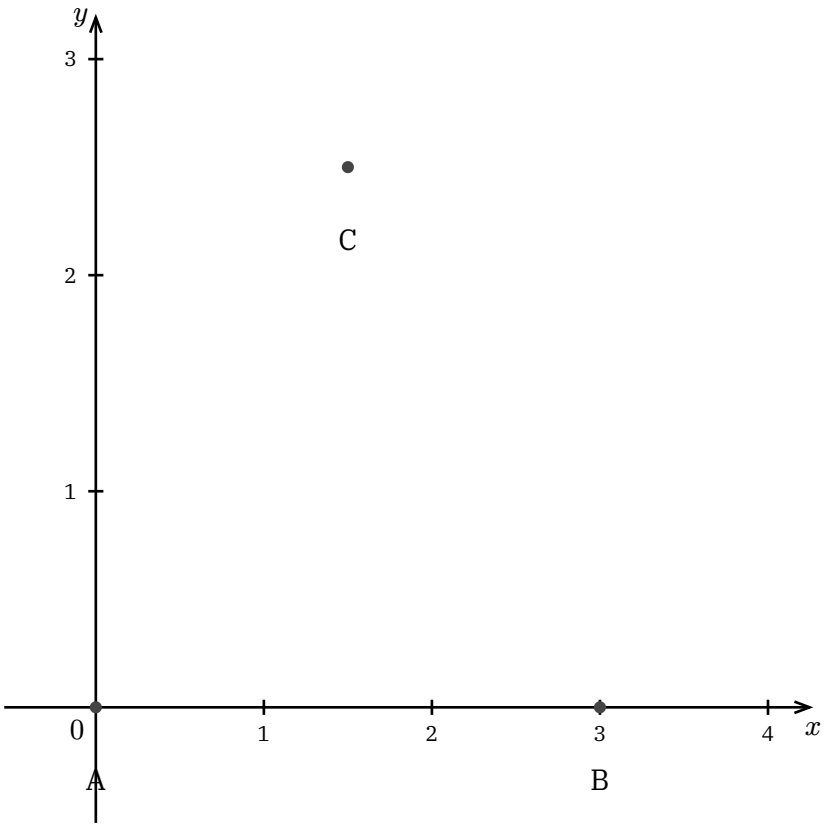
Chapter 02.02

Geometry (Geoplot)

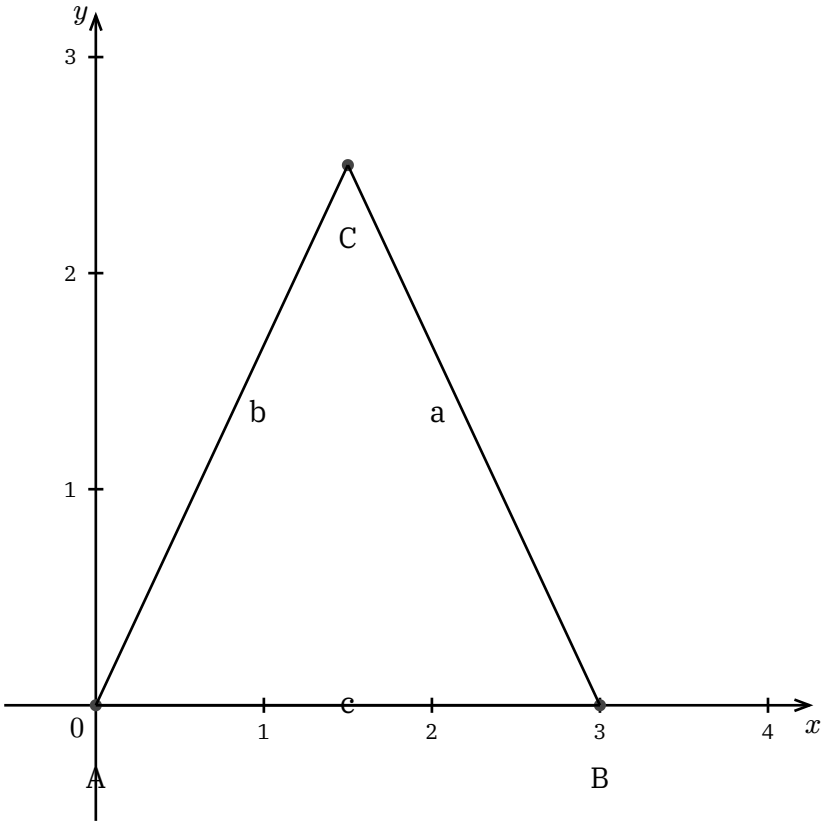
1 Geometry (Geoplot)

Create Euclidean geometry constructions with the geometry object system.

1.1 Points & Labels

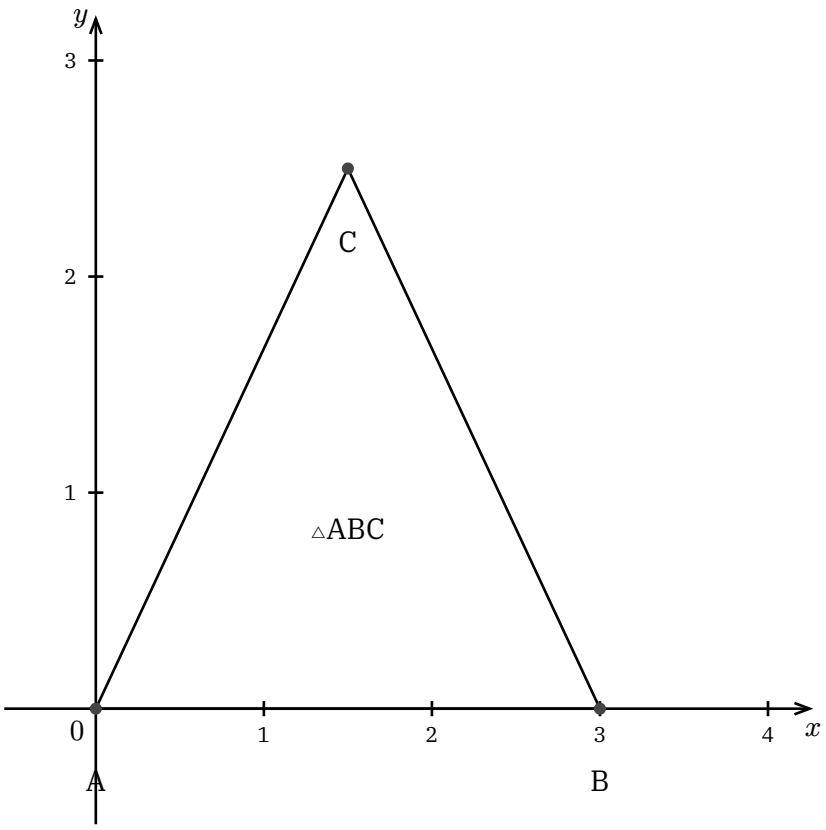


1.2 Lines & Segments

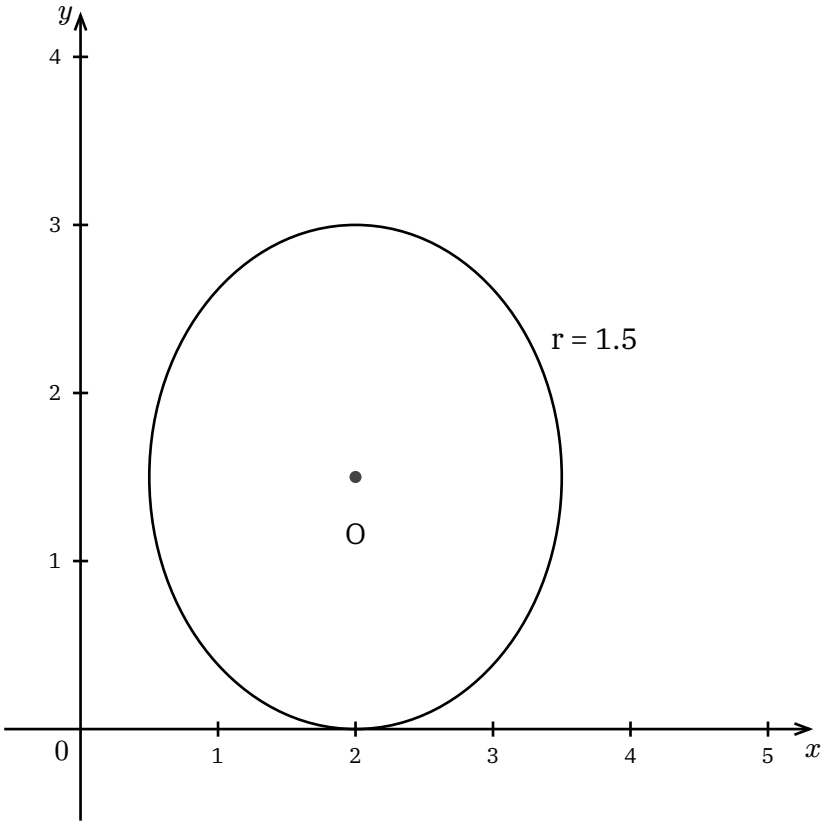


1.3 Triangles

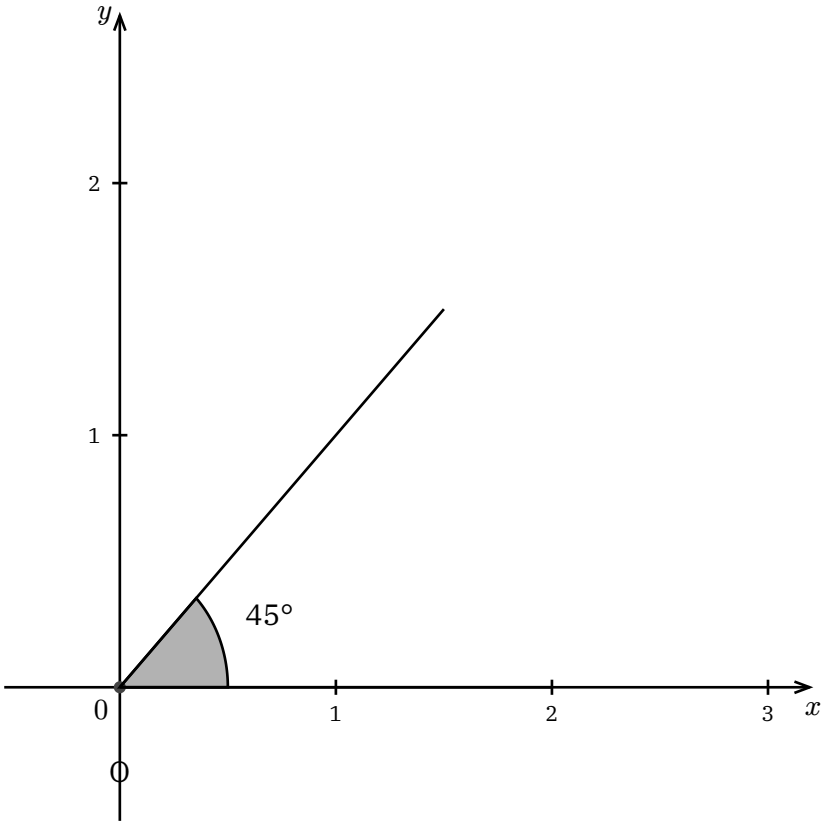
The `triangle` object draws all three sides:



1.4 Circles



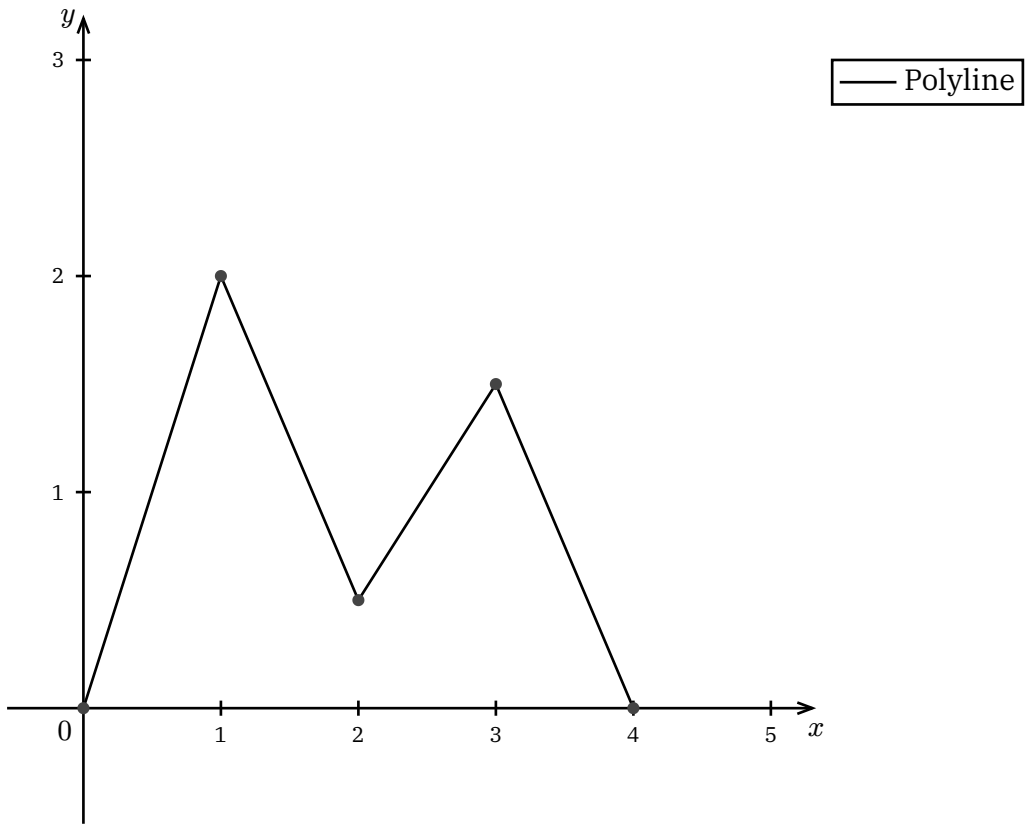
1.5 Angles



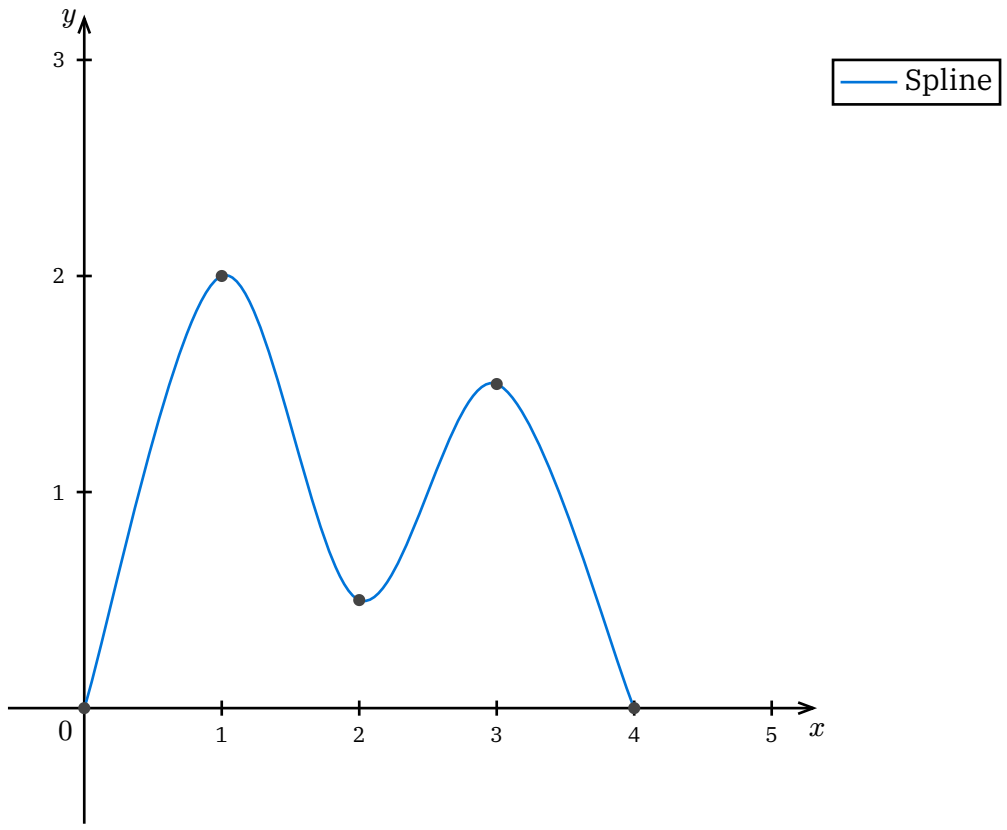
1.6 Curves

Connect points with polylines or smooth splines:

1.6.1 Polyline (curve-through)

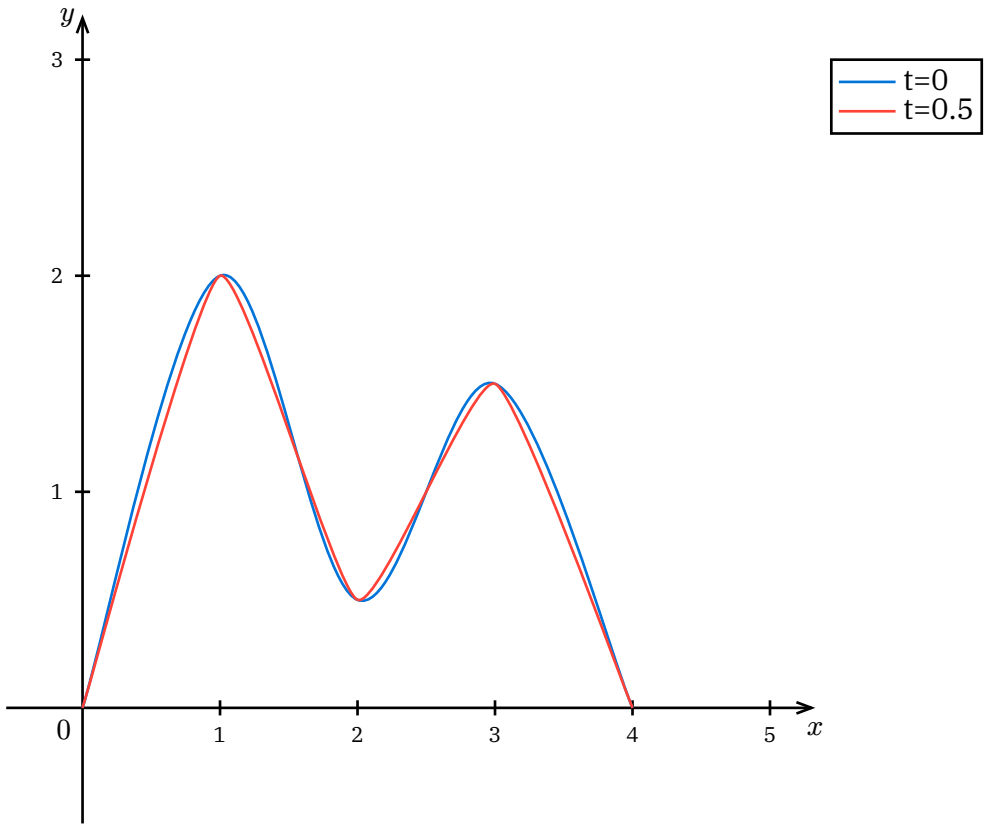


1.6.2 Smooth Spline (smooth-curve)



1.6.3 Tension Control

Higher tension creates tighter curves:



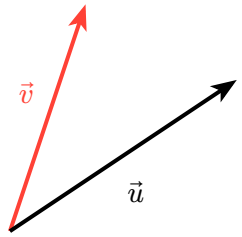
Chapter 02.03

Vectors (Vectorplot)

1 Vectors (Vectorplot)

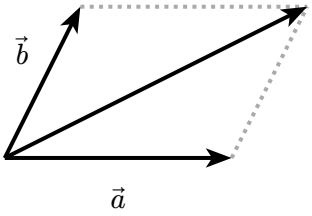
Visualize vectors with automatic scaling and labeling.

1.1 Basic Vectors

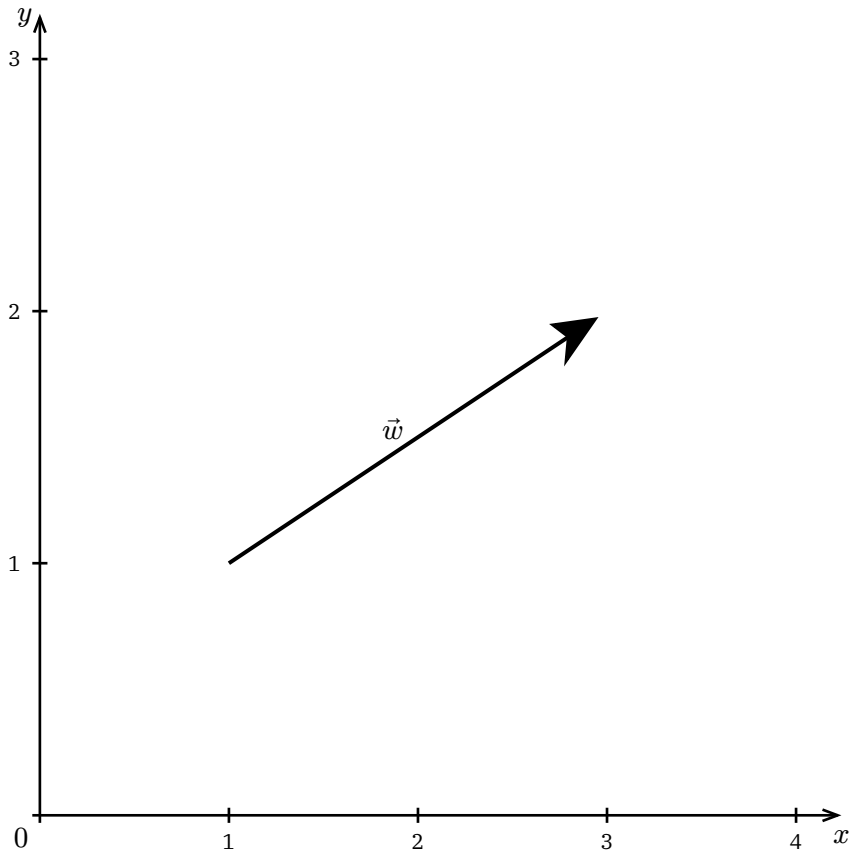


1.2 Vector Addition

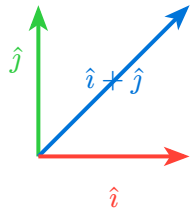
The parallelogram method:



1.3 Vector with Custom Origin

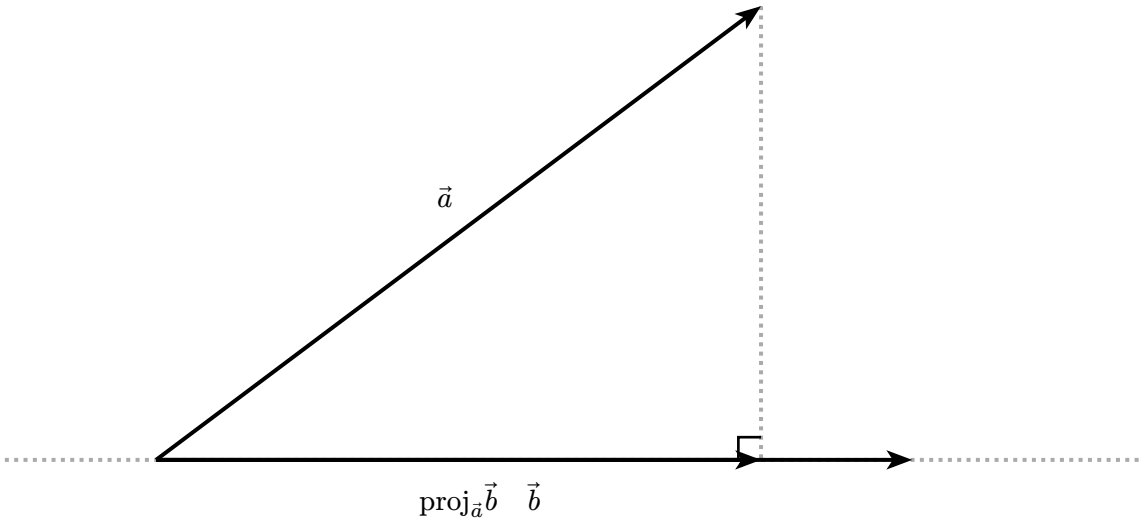


1.4 Multiple Vectors



1.5 Vector Projection

Project vector $\vec{a}$ onto $\vec{b}$:



Note | Vector Notation

Vectors are defined by `vector(dx, dy, ...)` where `dx` and `dy` are the components.

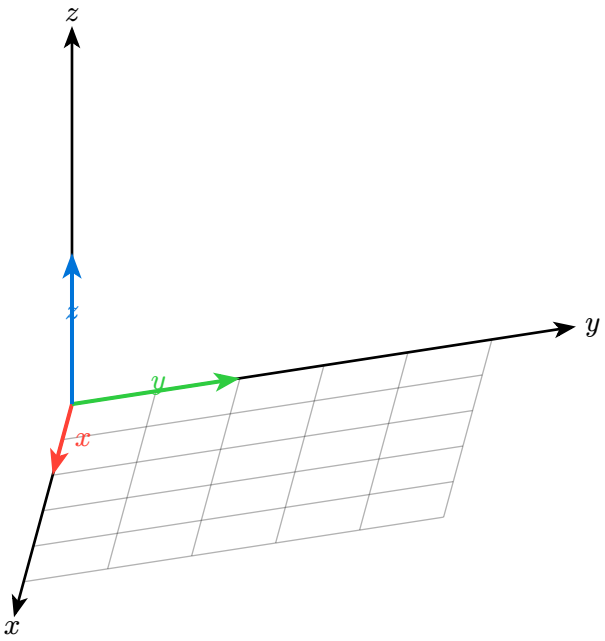
Chapter 02.04

3D Space (Spaceplot)

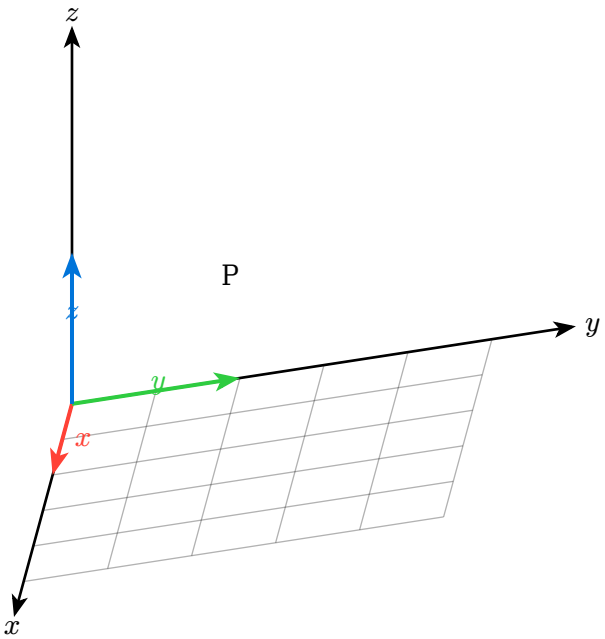
1 3D Space (Spaceplot)

Render 3D scenes with perspective projection.

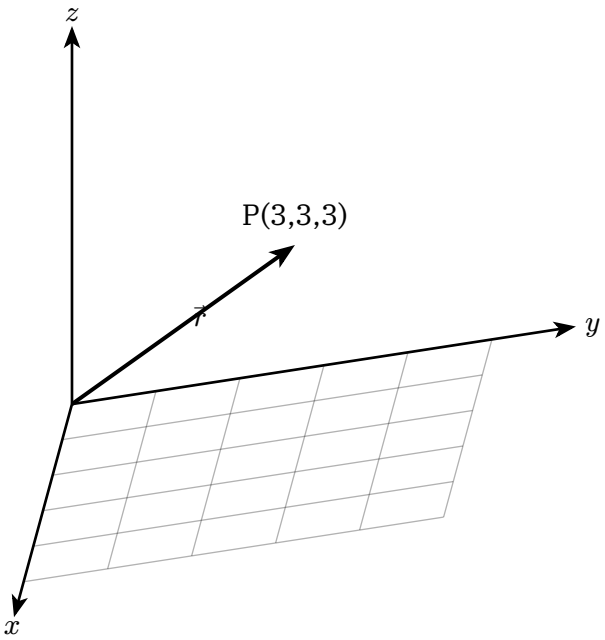
1.1 Coordinate Axes



1.2 3D Points

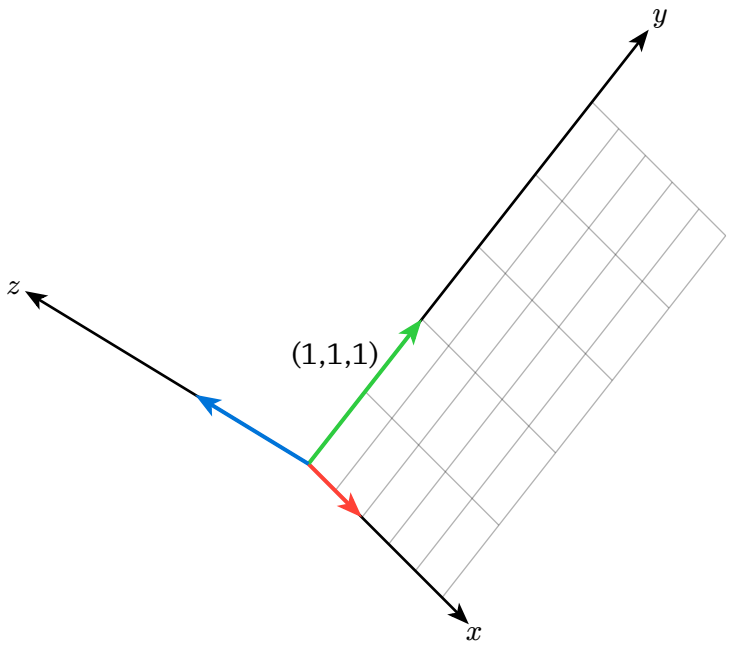


1.3 3D Vectors



1.4 Custom View Angles

Change perspective with the `view` parameter:



Note | View Angle

The `view` parameter takes rotation angles for each axis to control the 3D projection.

Chapter 02.05

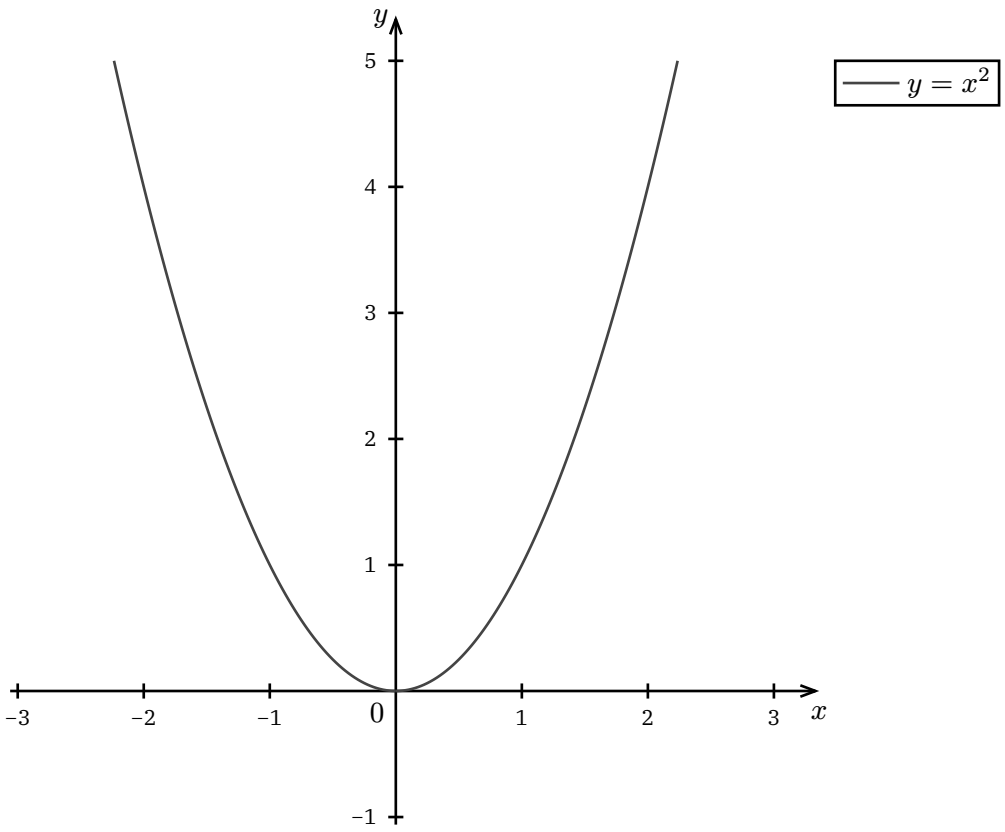
Custom Plots

1 Data Visualization

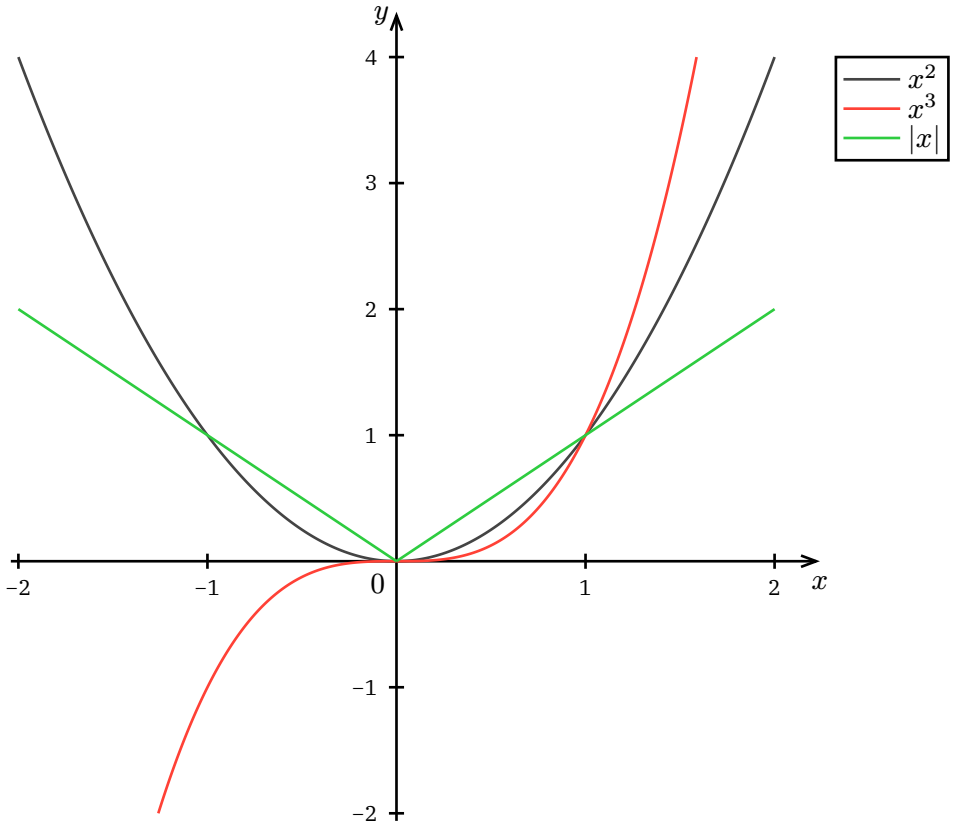
Function plotting and data series.

1.1 Function Graphs

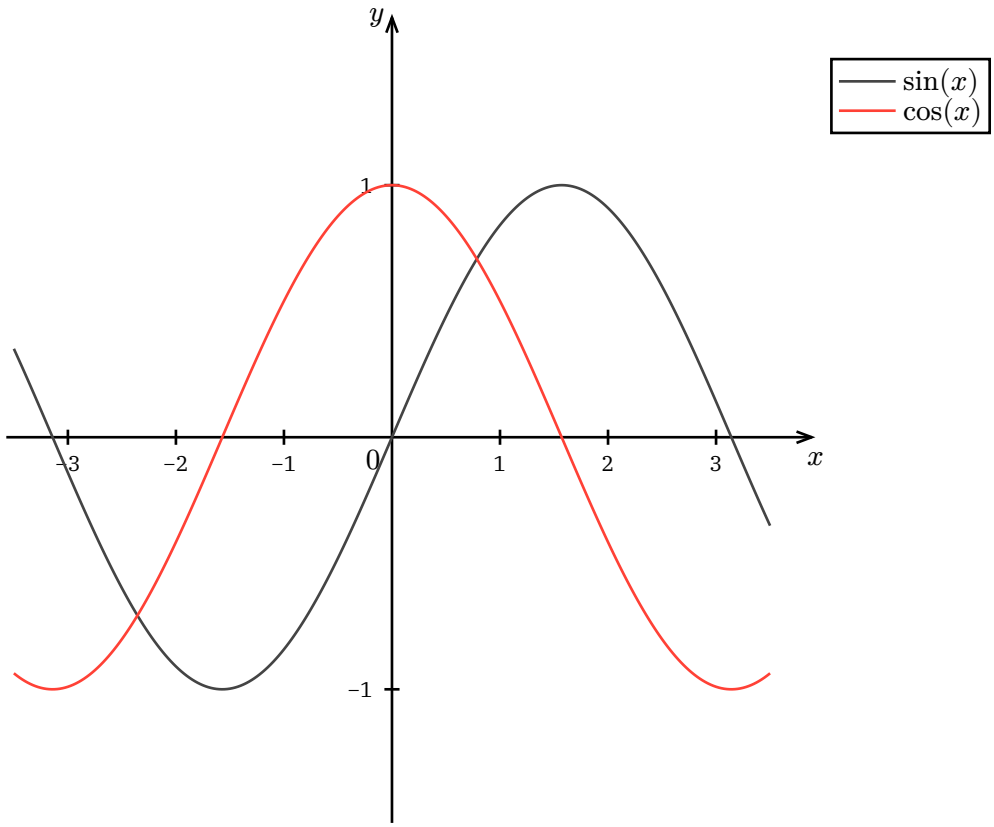
Plot mathematical functions with `graph`:



1.2 Multiple Functions

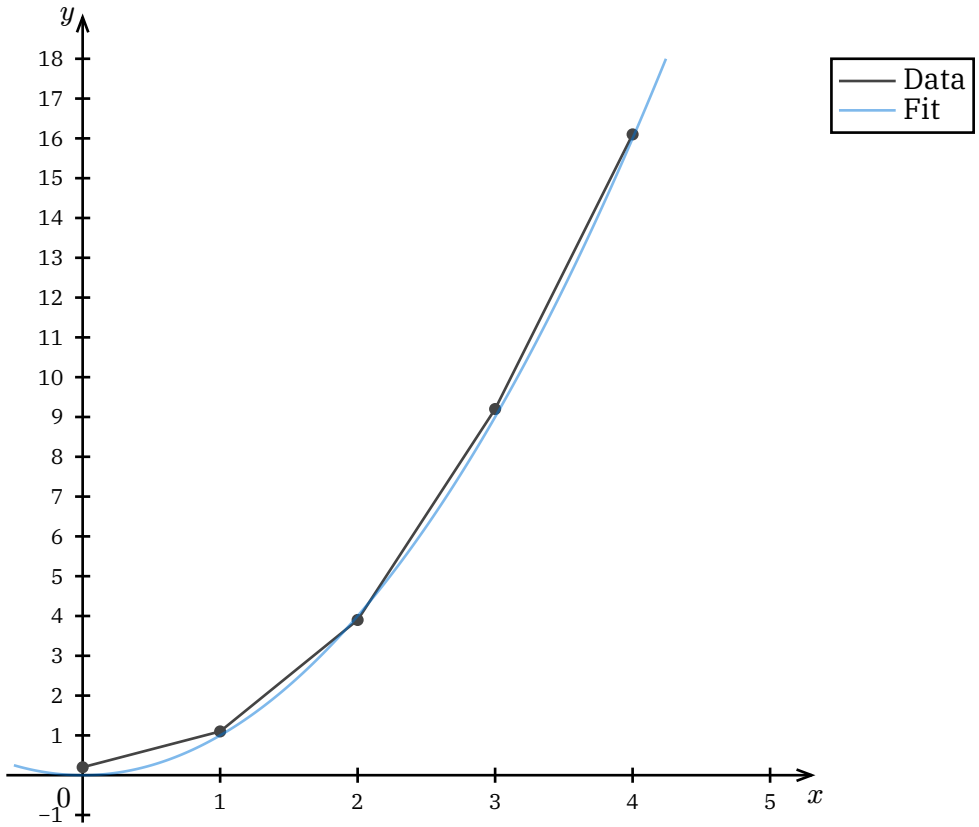


1.3 Trigonometric Functions



1.4 Data Series

Plot data points from arrays:



Note | Data Series

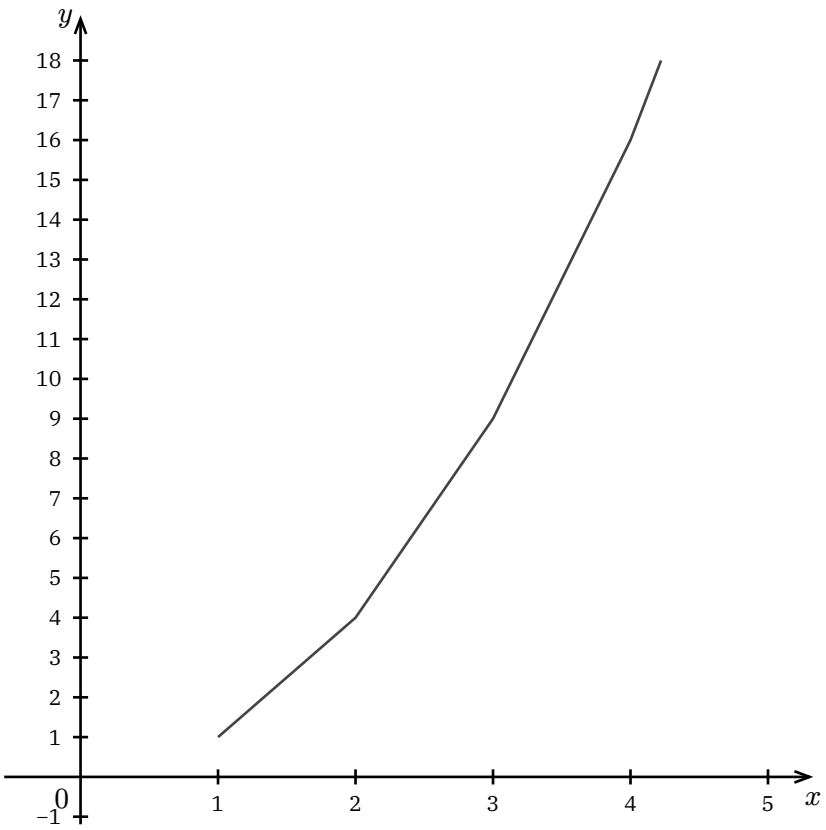
Use `data-series(data, plot-type: "scatter" | "line" | "both")` to plot data points.

1.5 CSV Data

Load data from CSV files:

```
#let my-data = csv-series(
  read("path/to/data.csv"),
  plot-type: "scatter",
  has-header: true,
)
```

This can be then used to draw the data series: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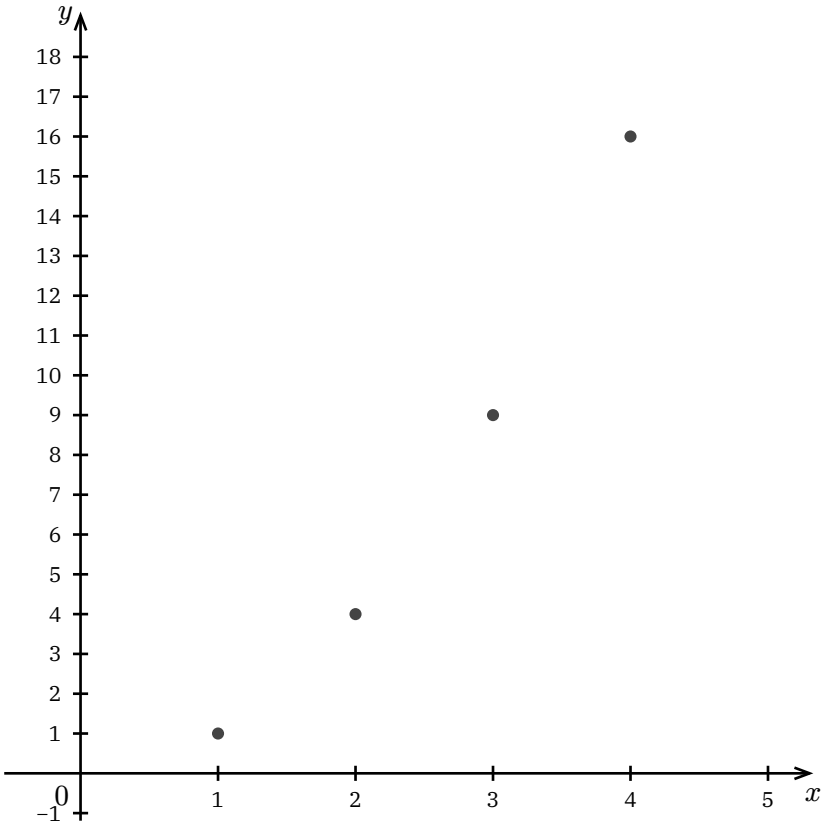
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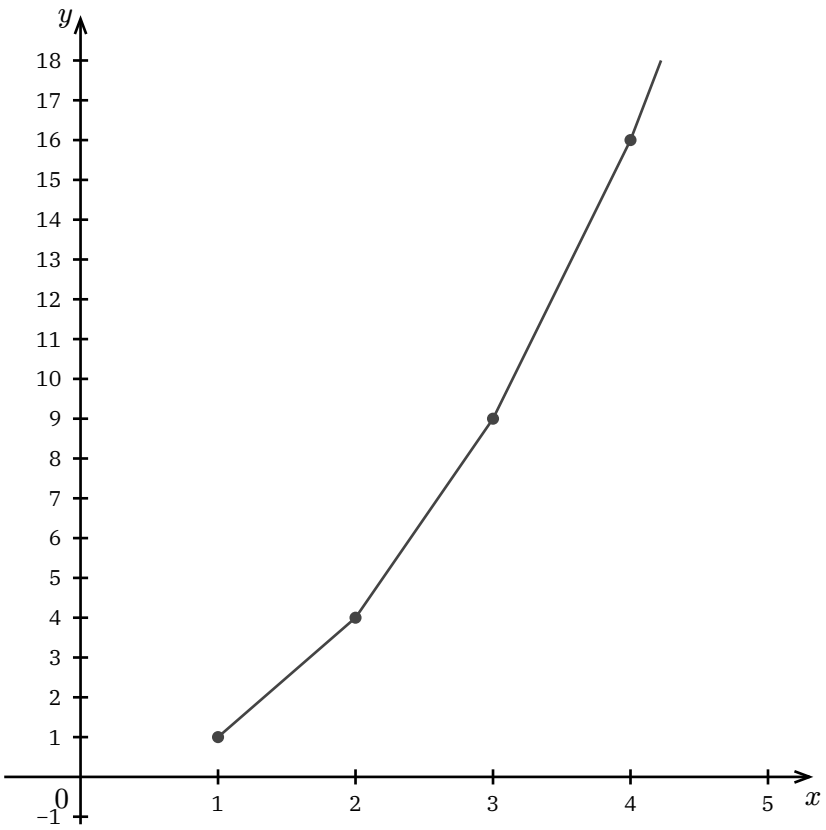
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