1 Design Principles

1.1 Special Syntax For Specifying Points

1.2 Special Syntax For Path Specifications

1.3 Actions on Paths

1.4 Key-Value Syntax for Graphic Parameters

1.5 Special Syntax for Specifying Nodes

1.6 Special Syntax for Specifying Trees

1.7 Grouping of Graphic Parameters

1.8 Coordinate Transformation System

2 Hierarchical Structures: Package, Environments, Scopes, and Styles

2.1 Loading the Package and the Libraries

```
\usepackage{tikz} % LaTeX
\input tikz.tex   % plain TeX
\usemodule[tikz]  % ConTeXt
```

`\usetikzlibrary{`⟨*list of libraries*⟩`}`

2.2 Creating a Picture

2.2.1 Creating a Picture Using an Environment

`/tikz/baseline=`⟨*dimension or coordinate or* ***default***⟩ (default `0pt`)

`/tikz/execute at begin picture=`⟨*code*⟩ (no default)

`/tikz/execute at end picture=`⟨*code*⟩ (no default)

`/tikz/every picture` (style, initially empty)

2.2.2 Creating a Picture Using a Command

`\tikz[`⟨*options*⟩`]{`⟨*path commands*⟩`}`

2.2.3 Adding a Background

2.3 Using Scopes to Structure a Picture

2.3.1 The Scope Environment

`/tikz/every scope` (style, initially empty)

`/tikz/execute at begin scope=`⟨*code*⟩ (no default)

`/tikz/execute at end scope=`⟨*code*⟩ (no default)

2.3.2 Shorthand for Scope Environments

2.3.3 Single Command Scopes

`\scoped[`⟨*options*⟩`]`⟨*path command*⟩

2.3.4 Using Scopes Inside Paths

2.4 Using Graphic Options

2.4.1 How Graphic Options Are Processed

`\tikzset{`⟨*options*⟩`}`

2.4.2 Using Styles to Manage How Pictures Look

3 Specifying Coordinates

3.1 Overview

3.2 Coordinate Systems

3.2.1 Canvas, XYZ, and Polar Coordinate Systems

Coordinate system `canvas`

`/tikz/cs/x`=⟨*dimension*⟩ (no default, initially `0pt`)

`/tikz/cs/y`=⟨*dimension*⟩ (no default, initially `0pt`)

Coordinate system `xyz`

`/tikz/cs/x`=⟨*factor*⟩ (no default, initially `0`)

`/tikz/cs/y`=⟨*factor*⟩ (no default, initially `0`)

`/tikz/cs/z`=⟨*factor*⟩ (no default, initially `0`)

Coordinate system `canvas polar`

`/tikz/cs/angle`=⟨*degrees*⟩ (no default)

`/tikz/cs/radius`=⟨*dimension*⟩ (no default)

`/tikz/cs/x radius`=⟨*dimension*⟩ (no default)

`/tikz/cs/y radius`=⟨*dimension*⟩ (no default)

Coordinate system `xyz polar`

`/tikz/cs/angle`=⟨*degrees*⟩ (no default)

`/tikz/cs/radius`=⟨*factor*⟩ (no default)

`/tikz/cs/x radius`=⟨*dimension*⟩ (no default)

A specific factor by

`/tikz/cs/y radius`=⟨*dimension*⟩ (no default)

Coordinate system `xy polar`

3.2.2 Barycentric Systems

Coordinate system `barycentric`

3.2.3 Node Coordinate System

Coordinate system `node`

`/tikz/cs/name`=⟨*node name*⟩ (no default)

`/tikz/anchor`=⟨*anchor*⟩ (no default)

`/tikz/cs/angle`=⟨*degrees*⟩ (no default)

3.2.4 Tangent Coordinate Systems

Coordinate system `tangent`

`/tikz/cs/node`=⟨*node*⟩ (no default)

`/tikz/cs/point`=⟨*point*⟩ (no default)

`/tikz/cs/solution`=⟨*number*⟩ (no default)

3.2.5 Defining New Coordinate Systems

`\tikzdeclarecoordinatesystem{`⟨*name*⟩`}{`⟨*code*⟩`}`

`\tikzaliascoordinatesystem{`⟨*new name*⟩`}{`⟨*old name*⟩`}`

3.3 Coordinates at Intersections

3.3.1 Intersections of Perpendicular Lines

Coordinate system `perpendicular`

`/tikz/cs/horizontal line through={(`⟨*coordinate*⟩`)}` (no default)

`/tikz/cs/vertical line through={(`⟨*coordinate*⟩`)}` (no default)

3.3.2 Intersections of Arbitrary Paths

`/tikz/name path=`⟨*name*⟩ (no default)
`/tikz/name path global=`⟨*name*⟩ (no default)

`/tikz/name intersections={`⟨*options*⟩`}` (no default)

`/tikz/intersection/of=`⟨*name path 1*⟩ `and` ⟨*name path 2*⟩ (no default)

`/tikz/intersection/name=`⟨*prefix*⟩ (no default, initially `intersection`)

`/tikz/intersection/total=`⟨*macro*⟩ (no default)

`/tikz/intersection/by=`⟨*comma-separated list*⟩ (no default)

`/tikz/intersection/sort by=`⟨*path name*⟩ (no default)

3.4 Relative and Incremental Coordinates

3.4.1 Specifying Relative Coordinates

3.4.2 Relative Coordinates and Scopes

`/tikz/current point is local=`⟨*boolean*⟩ (no default, initially `false`)

3.5 Coordinate Calculations

3.5.1 The General Syntax

3.5.2 The Syntax of Factors

3.5.3 The Syntax of Partway Modifiers

3.5.4 The Syntax of Distance Modifiers

3.5.5 The Syntax of Projection Modifiers

4 Syntax for Path Specifications

`\path`⟨*specification*⟩`;`

`/tikz/every path` (style, initially empty)

`/tikz/insert path=`⟨*path*⟩ (no default)

`/tikz/append after command=`⟨*path*⟩ (no default)

`/tikz/prefix after command=`⟨*path*⟩ (no default)

4.1 The Move-To Operation

`\path` … ⟨*coordinate*⟩ … `;`

4.2 The Line-To Operation

4.2.1 Straight Lines

\path … --⟨*coordinate*⟩ … ;

4.2.2 Horizontal and Vertical Lines

\path … -|⟨*coordinate*⟩ … ;

\path … |-⟨*coordinate*⟩ … ;

4.3 The Curve-To Operation

\path … ..controls⟨*c*⟩and⟨*d*⟩..⟨*y*⟩ … ;

4.4 The Cycle Operation

\path … --cycle … ;

4.5 The Rectangle Operation

\path … rectangle⟨*corner*⟩ … ;

4.6 Rounding Corners

/tikz/rounded corners=⟨*inset*⟩ (default 4pt)

/tikz/sharp corners (no value)

4.7 The Circle and Ellipse Operations

\path … circle[⟨*options*⟩] … ;

/tikz/x radius=⟨*value*⟩ (no default)

/tikz/y radius=⟨*value*⟩ (no default)

/tikz/radius=⟨*value*⟩ (no default)

/tikz/at=⟨*coordinate*⟩ (no default)

/tikz/every circle (style, no value)

\path … ellipse[⟨*options*⟩] … ;

4.8 The Arc Operation

\path … arc[⟨*options*⟩] … ;

/tikz/start angle=⟨*degrees*⟩ (no default)

/tikz/end angle=⟨*degrees*⟩ (no default)

/tikz/delta angle=⟨*degrees*⟩ (no default)

4.9 The Grid Operation

\path … grid[⟨*options*⟩]⟨*corner*⟩ … ;

/tikz/step=⟨*number or dimension or coordinate*⟩ (no default, initially 1cm)

/tikz/xstep=⟨*dimension or number*⟩ (no default, initially 1cm)

/tikz/ystep=⟨*dimension or number*⟩ (no default, initially 1cm)

/tikz/help lines (style, initially line width=0.2pt,gray)

4.10 The Parabola Operation

\path … parabola[⟨*options*⟩]bend⟨*bend coordinate*⟩⟨*coordinate*⟩ … ;

/tikz/bend=⟨*coordinate*⟩ (no default)

/tikz/bend pos=⟨*fraction*⟩ (no default)

/tikz/parabola height=⟨*dimension*⟩ (no default)

/tikz/bend at start (style, no value)

/tikz/bend at end (style, no value)

4.11 The Sine and Cosine Operation

\path … sin⟨*coordinate*⟩ … ;

\path … cos⟨*coordinate*⟩ … ;

4.12 The SVG Operation

\path … svg[⟨*options*⟩]"⟨*path data*⟩" … ;

4.13 The Plot Operation

4.14 The To Path Operation

\path … to[⟨*options*⟩] ⟨*nodes*⟩ (⟨*coordinate*⟩) … ;

/tikz/edge node=⟨*node specification*⟩ (no default)

/tikz/edge label=⟨*text*⟩ (no default)

/tikz/edge label'=⟨*text*⟩ (no default)

/tikz/every to (style, initially empty)

/tikz/to path=⟨*path*⟩ (no default)

/tikz/execute at begin to=⟨*code*⟩ (no default)

/tikz/execute at end to=⟨*code*⟩ (no default)

/tikz/every to (style, initially empty)

4.15 The Let Operation

\path … let⟨*assignment*⟩ ,⟨*assignment*⟩,⟨*assignment*⟩… in … ;

\n{⟨*number register*⟩}

\p{⟨*point register*⟩}

\x{⟨*point register*⟩}

\y{⟨*point register*⟩}

4.16 The Scoping Operation

4.17 The Node and Edge Operations

4.18 The Graph Operation

4.19 The PGF-Extra Operation

\pgfextra{⟨*code*⟩}

\pgfextra⟨*code*⟩ \endpgfextra

5 Actions on Paths

5.1 Overview

\draw

\fill

\filldraw

\pattern

\shade

\shadedraw

\clip

\useasboundingbox

5.2 Specifying a Color

/tikz/color=⟨*color name*⟩ (no default)

5.3 Drawing a Path

/tikz/draw=⟨*color*⟩ (default is scope's color setting)

5.3.1 Graphic Parameters: Line Width, Line Cap, and Line Join

/tikz/line width=⟨*dimension*⟩ (no default, initially 0.4pt)

/tikz/ultra thin (style, no value)

/tikz/very thin (style, no value)

/tikz/thin (style, no value)

/tikz/semithick (style, no value)

/tikz/thick (style, no value)

/tikz/very thick (style, no value)

/tikz/ultra thick (style, no value)

/tikz/line cap=⟨*type*⟩ (no default, initially butt)

/tikz/line join=⟨*type*⟩ (no default, initially miter)

/tikz/miter limit=⟨*factor*⟩ (no default, initially 10)

5.3.2 Graphic Parameters: Dash Pattern

/tikz/dash pattern=⟨*dash pattern*⟩ (no default)

/tikz/dash phase=⟨*dash phase*⟩ (no default, initially 0pt)

/tikz/solid (style, no value)

/tikz/dotted (style, no value)

/tikz/densely dotted (style, no value)

/tikz/loosely dotted (style, no value)

/tikz/dashed (style, no value)

/tikz/densely dashed (style, no value)

/tikz/loosely dashed (style, no value)

/tikz/dashdotted (style, no value)

/tikz/densely dashdotted (style, no value)

/tikz/loosely dashdotted (style, no value)

/tikz/dashdotdotted (style, no value)

/tikz/densely dashdotdotted (style, no value)

/tikz/loosely dashdotdotted (style, no value)

5.3.3 Graphic Parameters: Draw Opacity

5.3.4 Graphic Parameters: Arrow Tips

/tikz/arrows=⟨*start arrow kind*⟩-⟨*end arrow kind*⟩ (no default)

/tikz/>=⟨*end arrow kind*⟩ (no default)

/tikz/shorten >=⟨*dimension*⟩ (no default, initially 0pt)

/tikz/shorten <=⟨*dimension*⟩ (no default)

5.3.5 Graphic Parameters: Double Lines and Bordered Lines

/tikz/double=⟨*core color*⟩ (default white)

/tikz/double distance=⟨*dimension*⟩ (no default, initially 0.6pt)

/tikz/double distance between line centers=⟨*dimension*⟩ (no default)

/tikz/double equal sign distance (style, no value)

5.4 Filling a Path

/tikz/fill=⟨*color*⟩ (default is scope's color setting)

5.4.1 Graphic Parameters: Fill Pattern

/tikz/pattern=⟨*name*⟩ (default is scope's pattern)

/tikz/pattern color=⟨*color*⟩ (no default)

5.4.2 Graphic Parameters: Interior Rules

/tikz/nonzero rule (no value)

/tikz/even odd rule (no value)

5.4.3 Graphic Parameters: Fill Opacity

5.5 Generalized Filling: Using Arbitrary Pictures to Fill a Path

/tikz/path picture=⟨*code*⟩ (no default)

Predefined node path picture bounding box

5.6 Shading a Path

/tikz/shade (no value)

/tikz/shading=⟨*name*⟩ (no default)

/tikz/shading angle=⟨*degrees*⟩ (no default, initially 0)

5.7 Establishing a Bounding Box

/tikz/use as bounding box (no value)

/tikz/trim left=⟨*dimension or coordinate or* ***default***⟩ (default 0pt)

/tikz/trim right=⟨*dimension or coordinate or* ***default***⟩ (no default)

/pgf/trim lowlevel=true|false (no default, initially false)

5.8 Clipping and Fading (Soft Clipping)

/tikz/clip (no value)

5.9 Doing Multiple Actions on a Path

/tikz/preactions=⟨*options*⟩ (no default)

/tikz/postaction=⟨*options*⟩ (no default)

5.10 Decorating and Morphing a Path

6 Nodes and Edges

6.1 Overview

6.2 Nodes and Their Shapes

\path … node[⟨*options*⟩](⟨*name*⟩)at(⟨*coordinate*⟩){⟨*text*⟩} …;

/tikz/name=⟨*node name*⟩ (no default)

/tikz/alias=⟨*another node name*⟩ (no default)

/tikz/at=⟨*coordinate*⟩ (no default)

/tikz/shape=⟨*shape name*⟩ (no default, initially `rectangle`)

/tikz/every node (style, initially empty)

/tikz/every ⟨*shape*⟩ node (style, initially empty)

\path … coordinate[⟨*options*⟩](⟨*name*⟩)at(⟨*coordinate*⟩) …;

\node

\coordinate

6.2.1 Predefined Shapes

6.2.2 Common Options: Separations, Margins, Padding and Border Rotation

/pgf/inner sep=⟨*dimension*⟩ (no default, initially `.3333em`)

/pgf/inner xsep=⟨*dimension*⟩ (no default, initially `.3333em`)

/pgf/inner ysep=⟨*dimension*⟩ (no default, initially `.3333em`)

/pgf/outer sep=⟨*dimension*⟩ (no default, initially `.5\pgflinewidth`)

/pgf/outer xsep=⟨*dimension*⟩ (no default, initially `.5\pgflinewidth`)

/pgf/outer ysep=⟨*dimension*⟩ (no default, initially `.5\pgflinewidth`)

/pgf/minimum height=⟨*dimension*⟩ (no default, initially `0pt`)

/pgf/minimum width=⟨*dimension*⟩ (no default, initially `0pt`)

/pgf/minimum size=⟨*dimension*⟩ (no default)

/pgf/shape aspect=⟨*aspect ratio*⟩ (no default)

/pgf/shape border uses incircle=⟨*boolean*⟩ (default `true`)

/pgf/shape border rotate=⟨*angle*⟩ (no default, initially `0`)

6.3 Multi-Part Nodes

\nodepart[⟨*options*⟩]{⟨*part name*⟩}

/tikz/every ⟨*part name*⟩ node part (style, initially empty)

6.4 The Node Text

6.4.1 Text Parameters: Color and Opacity

/tikz/text=⟨*color*⟩ (no default)

6.4.2 Text Parameters: Font

/tikz/font=⟨*font commands*⟩ (no default)

6.4.3 Text Parameters: Alignment and Width for Multi-Line Text

/tikz/text width=⟨*dimension*⟩ (no default)

/tikz/align=⟨*alignment option*⟩ (no default)

/tikz/node halign header=⟨*macro storing a header*⟩ (no default, initially empty)

6.4.4 Text Parameters: Height and Depth of Text

/tikz/text height=⟨*dimension*⟩ (no default)

/tikz/text depth=⟨*dimension*⟩ (no default)

6.5 Positioning Nodes

6.5.1 Positioning Nodes Using Anchors

/tikz/anchor=⟨*anchor name*⟩ (no default)

6.5.2 Basic Placement Options

/tikz/above=⟨*offset*⟩ (default `0pt`)

/tikz/below=⟨*offset*⟩ (default `0pt`)

/tikz/left=⟨*offset*⟩ (default `0pt`)

/tikz/right=⟨*offset*⟩ (default `0pt`)

/tikz/above left (no value)

/tikz/above right (no value)

/tikz/below left (no value)

/tikz/below right (no value)

6.5.3 Advanced Placement Options

/tikz/above=⟨*specification*⟩ (default `0pt`)

/tikz/on grid=⟨*boolean*⟩ (no default, initially `false`)

/tikz/node distance=⟨*shifting part*⟩ (no default, initially `1cm and 1cm`)

/tikz/below=⟨*specification*⟩ (no default)

/tikz/left=⟨*specification*⟩ (no default)

/tikz/right=⟨*specification*⟩ (no default)

/tikz/above left=⟨*specification*⟩ (no default)

/tikz/below left=⟨*specification*⟩ (no default)

/tikz/above right=⟨*specification*⟩ (no default)

/tikz/below right=⟨*specification*⟩ (no default)

/tikz/base left=⟨*specification*⟩ (no default)

/tikz/base right=⟨*specification*⟩ (no default)

/tikz/mid left=⟨*specification*⟩ (no default)

/tikz/mid right=⟨*specification*⟩ (no default)

6.5.4 Arranging Nodes Using Chains and Matrices

6.6 Fitting Nodes to a Set of Coordinates

6.7 Transformations

`/tikz/transform shape` (no value)

6.8 Placing Nodes on a Line or Curve Explicitly

`/tikz/pos=`⟨*fraction*⟩ (no default)

`/tikz/auto=`⟨*direction*⟩ (default is scope's setting)

`/tikz/swap` (no value)

`/tikz/'` (no value)

`/tikz/sloped` (no value)

`/tikz/allow upside down=`⟨*boolean*⟩ (default `true, initially false`)

`/tikz/midway` (style, no value)

`/tikz/near start` (style, no value)

`/tikz/near end` (style, no value)

`/tikz/very near start` (style, no value)

`/tikz/very near end` (style, no value)

`/tikz/at start` (style, no value)

`/tikz/at end` (style, no value)

6.9 Placing Nodes on a Line or Curve Implicitly

6.10 The Label and Pin Options

6.10.1 Overview

6.10.2 The Label Option

`/tikz/label=[`⟨*options*⟩`]`⟨*angle*⟩`:`⟨*text*⟩ (no default)

`/tikz/label position=`⟨*angle*⟩ (no default, initially `above`)

`/tikz/absolute=`⟨*true or false*⟩ (default `true`)

`/tikz/label distance=`⟨*distance*⟩ (no default, initially `0pt`)

`/tikz/every label` (style, initially empty)

6.10.3 The Pin Option

`/tikz/pin=[`⟨*options*⟩`]`⟨*angle*⟩`:`⟨*text*⟩ (no default)

`/tikz/pin distance=`⟨*distance*⟩ (no default, initially `3ex`)

`/tikz/every pin` (style, initially `draw=none,fill=none`)

`/tikz/pin position=`⟨*angle*⟩ (no default, initially `above`)

`/tikz/every pin edge` (style, initially `help lines`)

`/tikz/pin edge=`⟨*options*⟩ (no default, initially empty)

6.10.4 The Quotes Syntax

`/tikz/quotes mean label` (no value)

`/tikz/every label quotes` (style, no value)

`/tikz/quotes mean pin` (no value)

`/tikz/every pin quotes` (style, no value)

`/tikz/node quotes mean=`⟨*replacement*⟩ (no default)

6.11 Connecting Nodes: Using Nodes as Coordinates

6.12 Connecting Nodes: Using the Edge Operation

6.12.1 Basic Syntax of the Edge Operation

`\path` … `edge[`⟨*options*⟩`]` ⟨*nodes*⟩ `(`⟨*coordinate*⟩`)` … `;`

`/tikz/every edge` (style, initially `draw`)

6.12.2 Nodes on Edges: Quotes Syntax

`/tikz/every edge quotes` (style, initially `auto`)

6.13 Referencing Nodes Outside the Current Picture

6.13.1 Referencing a Node in a Different Picture

`/tikz/remember picture=`⟨*boolean*⟩ (no default, initially `false`)

`/tikz/overlay` (no value)

6.13.2 Referencing the Current Page Node – Absolute Positioning

6.14 Late Code and Late Options

`\tikzlastnode`

`/tikz/late options=`⟨*options*⟩ (no default)

7 Specifying Graphs

7.1 Overview

7.2 Concepts

7.2.1 Concept: Node Chains

7.2.2 Concept: Chain Groups

7.2.3 Concept: Edge Labels and Styles

7.2.4 Concept: Node Sets

7.2.5 Concept: Graph Macros

7.2.6 Concept: Graph Expressions and Color Classes

7.3 Syntax of the Graph Path Command

7.3.1 The Graph Command

`\graph`

`\path` … `graph[`⟨*options*⟩`]`⟨*group specification*⟩ … `;`

`\tikzgraphsset{`⟨*options*⟩`}`

`/tikz/graphs/every graph` (style, no value)

/tikz/graphs/nodes=⟨*options*⟩ (no default)

/tikz/graphs/edges=⟨*options*⟩ (no default)

/tikz/graphs/edge=⟨*options*⟩ (no default)

/tikz/graphs/edge node=⟨*node specification*⟩ (no default)

/tikz/graphs/edge label=⟨*text*⟩ (no default)

/tikz/graphs/edge label'=⟨*text*⟩ (no default)

7.3.2 Syntax of Group Specifications

/tikz/graph/parse=⟨*text*⟩ (no default)

7.3.3 Syntax of Chain Specifications

/tikz/graphs/new ->={⟨*left node*⟩}{⟨*right node*⟩}{⟨*edge options*⟩}{⟨*edge nodes*⟩} (no default)

/tikz/every new -> (style, no value)

/tikz/graphs/left anchor=⟨*anchor*⟩ (no default)

/tikz/graphs/right anchor=⟨*anchor*⟩ (no default)

/tikz/graphs/new --={⟨*left node*⟩}{⟨*right node*⟩}{⟨*edge options*⟩}{⟨*edge nodes*⟩} (no default)

/tikz/every new -- (style, no value)

/tikz/graphs/new <->={⟨*left node*⟩}{⟨*right node*⟩}{⟨*edge options*⟩}{⟨*edge nodes*⟩} (no default)

/tikz/every new <-> (style, no value)

/tikz/graphs/new <-={⟨*left node*⟩}{⟨*right node*⟩}{⟨*edge options*⟩}{⟨*edge nodes*⟩} (no default)

/tikz/every new <- (style, no value)

/tikz/graphs/new -!-={⟨*left node*⟩}{⟨*right node*⟩}{⟨*edge options*⟩}{⟨*edge nodes*⟩} (no default)

7.3.4 Syntax of Node Specifications

/tikz/graphs/use existing node=⟨*true or false*⟩ (default `true`)

/tikz/graphs/fresh nodes=⟨*true or false*⟩ (default `true`)

/tikz/graphs/name=⟨*text*⟩ (no default)

/tikz/graphs/name separator=⟨*symbols*⟩ (no default, initially `\space`)

/tikz/graphs/as=⟨*text*⟩ (no default)

/tikz/graphs/typeset=⟨*code*⟩ (no default)

\tikzgraphnodetext

\tikzgraphnodepath

\tikzgraphnodefullname

/tikz/graphs/empty nodes (no value)

/tikz/graphs/math nodes (no value)

/tikz/new set=⟨*set name*⟩ (no default)

/tikz/set=⟨*set name*⟩ (no default)

7.3.5 Specifying Tries

/tikz/graphs/trie=⟨*true or false*⟩ (default `true, initially false`)

7.4 Simple Versus Multi-Graphs

/tikz/graphs/multi (no value)

/tikz/graphs/simple (no value)

7.5 Graph Edges: Labeling and Styling

7.5.1 Options For All Edges Between Two Groups

/tikz/graphs/edge quotes=⟨*options*⟩ (no default)

/tikz/graphs/edge quotes center (no value)

/tikz/graphs/edge quotes mid (no value)

7.5.2 Changing Options For Certain Edges

7.5.3 Options For Incoming and Outgoing Edges

/tikz/graphs/target edge style=⟨*options*⟩ (no default)

    /tikz/graphs/target edge clear (no value)

/tikz/graphs/target edge node=⟨*node specification*⟩ (no default)

/tikz/graphs/source edge style=⟨*options*⟩ (no default)

/tikz/graphs/source edge node=⟨*node specification*⟩ (no default)

/tikz/graphs/source edge clear=⟨*node specification*⟩ (no default)

7.5.4 Special Syntax for Options For Incoming and Outgoing Edges

/tikz/graphs/clear > (no value)

/tikz/graphs/clear < (no value)

7.5.5 Placing Node Texts on Incoming Edges

/tikz/graphs/put node text on incoming edges=⟨*options*⟩ (no default)

/tikz/graphs/put node text on outgoing edges=⟨*options*⟩ (no default)

7.6 Graph Operators, Color Classes, and Graph Expressions

7.6.1 Color Classes

/tikz/graphs/color class=⟨*color class name*⟩ (no default)

    /tikz/graphs/⟨*color class name*⟩ (no value)

    /tikz/graphs/not ⟨*color class name*⟩ (no value)

    /tikz/graphs/recolor ⟨*color class name*⟩ by=⟨*new color*⟩ (no default)

7.6.2 Graph Operators on Groups of Nodes

/tikz/graphs/operator=⟨*code*⟩ (no default)

    /tikz/graphs/default edge kind=⟨*value*⟩ (no default, initially --)

    /tikz/graphs/-- (no value)

    /tikz/graphs/-> (no value)

    /tikz/graphs/<- (no value)

    /tikz/graphs/<-> (no value)

    /tikz/graphs/-!- (no value)

    \tikzgraphforeachcolorednode{⟨*color name*⟩}{⟨*macro*⟩}

    \tikzgraphpreparecolor{⟨*color name*⟩}{⟨*counter*⟩}{⟨*prefix*⟩}

7.6.3 Graph Operators for Joining Groups

/tikz/graphs/default edge operator=⟨*key*⟩ (no default)

7.7 Graph Macros

/tikz/graphs/declare={⟨*graph name*⟩}{⟨*specification*⟩} (no default)

7.8 Online Placement Strategies

7.8.1 Manual Placement

/tikz/graphs/no placement (no value)

/tikz/graphs/x=⟨*x dimension*⟩ (no default)

/tikz/graphs/y=⟨*y dimension*⟩ (no default)

7.8.2 Placement on a Grid

/tikz/graphs/Cartesian placement (no value)

/tikz/graphs/chain shift=⟨*coordinate*⟩ (no default, initially `(1,0)`)

/tikz/graphs/group shift=⟨*coordinate*⟩ (no default, initially `(0,-1)`)

/tikz/graphs/grow up=⟨*distance*⟩ (default `1`)

/tikz/graphs/grow down=⟨*distance*⟩ (default `1`)

/tikz/graphs/grow left=⟨*distance*⟩ (default `1`)

/tikz/graphs/grow right=⟨*distance*⟩ (default `1`)

/tikz/graphs/branch up=⟨*distance*⟩ (default `1`)

/tikz/graphs/branch down=⟨*distance*⟩ (default `1`)

/tikz/graphs/branch left=⟨*distance*⟩ (default `1`)

/tikz/graphs/branch right=⟨*distance*⟩ (default `1`)

/tikz/graphs/grid placement (no value)

7.8.3 Placement Taking Node Sizes Into Account

/tikz/graphs/grow right sep=⟨*distance*⟩ (default `1em`)

/tikz/graphs/grow left sep=⟨*distance*⟩ (default `1em`)

/tikz/graphs/grow up sep=⟨*distance*⟩ (default `1em`)

/tikz/graphs/grow down sep=⟨*distance*⟩ (default `1em`)

/tikz/graphs/branch right sep=⟨*distance*⟩ (default `1em`)

/tikz/graphs/branch left sep=⟨*distance*⟩ (default `1em`)

/tikz/graphs/branch up sep=⟨*distance*⟩ (default `1em`)

/tikz/graphs/branch down sep=⟨*distance*⟩ (default `1em`)

7.8.4 Placement On a Circle

/tikz/graphs/circular placement (no value)

/tikz/graphs/chain polar shift=(⟨*angle*⟩:⟨*radius*⟩) (no default, initially `(0:1)`)

/tikz/graphs/group polar shift=(⟨*angle*⟩:⟨*radius*⟩) (no default, initially `(45:0)`)

/tikz/graphs/radius=⟨*dimension*⟩ (no default, initially `1cm`)

/tikz/graphs/phase=⟨*angle*⟩ (no default, initially `90`)

/tikz/graphs/clockwise=⟨*number*⟩ (default `\tikzgraphVnum`)

/tikz/graphs/counterclockwise=⟨*number*⟩ (default `\tikzgraphVnum`)

7.8.5 Levels and Level Styles

/tikz/graphs/placement/level (no value)

/tikz/graph/level=⟨*level*⟩ (style, no default)

/tikz/graph/level ⟨*level*⟩ (style, no value)

7.8.6 Defining New Online Placement Strategies

/tikz/graphs/placement/element count (no value)

/tikz/graphs/placement/width (no value)

/tikz/graphs/placement/logical node width=⟨*full node name*⟩ (no default)

/tikz/graphs/placement/element count (no value)

/tikz/graphs/placement/depth (no value)

/tikz/graphs/placement/logical node depth=⟨*full node name*⟩ (no default)

/tikz/graphs/placement/compute position=⟨*code*⟩ (no default)

/tikz/graphs/placement/place (no value)

7.9 Reference: Predefined Elements

7.9.1 Graph Macros

/tikz/graphs/V={⟨*list of vertices*⟩} (no default)

/tikz/graphs/n=⟨*number*⟩ (no default)

/tikz/graphs/name shore V (style, initially empty)

/tikz/graphs/name shore W (style, initially empty)

/tikz/graphs/W={⟨*list of vertices*⟩} (no default)

/tikz/graphs/m=⟨*number*⟩ (no default)

/tikz/graphs/wrap after=⟨*number*⟩ (no default)

7.9.2 Group Operators

/tikz/graphs/clique=⟨*color*⟩ (default `all`)

/tikz/graphs/induced independent set=⟨*color*⟩ (default `all`)

/tikz/graphs/cycle=⟨*color*⟩ (default `all`)

/tikz/graphs/induced cycle=⟨*color*⟩ (default `all`)

/tikz/graphs/path=⟨*color*⟩ (default `all`)

/tikz/graphs/induced path=⟨*color*⟩ (default `all`)

7.9.3 Joining Operators

/tikz/graphs/complete bipartite=⟨*from color*⟩⟨*to color*⟩ (default `{source'}{target'}`)

/tikz/graphs/induced complete bipartite (no value)

/tikz/graphs/matching=⟨*from color*⟩⟨*to color*⟩ (default `{source'}{target'}`)

/tikz/graphs/matching and star=⟨*from color*⟩⟨*to color*⟩ (default `{source'}{target'}`)

/tikz/graphs/butterfly=⟨*options*⟩ (no default)

/tikz/graphs/butterfly/level=⟨*level*⟩ (no default, initially `1`)

/tikz/graphs/butterfly/from=⟨*color*⟩ (no default, initially `target'`)

/tikz/graphs/butterfly/to=⟨*color*⟩ (no default, initially `source'`)

8 Matrices and Alignment

8.1 Overview

8.2 Matrices are Nodes

/tikz/matrix=⟨*true or false*⟩ (default true)

/tikz/every matrix (style, initially empty)

\matrix

8.3 Cell Pictures

8.3.1 Alignment of Cell Pictures

8.3.2 Setting and Adjusting Column and Row Spacing

/tikz/column sep=⟨*spacing list*⟩ (no default)

/tikz/row sep=⟨*spacing list*⟩ (no default)

8.3.3 Cell Styles and Options

/tikz/every cell={⟨*row*⟩}{⟨*column*⟩} (style, no default, initially empty)

/tikz/cells=⟨*options*⟩ (no default)

/tikz/nodes=⟨*options*⟩ (no default)

/tikz/column ⟨*number*⟩ (style, no value)

/tikz/every odd column (style, no value)

/tikz/every even column (style, no value)

/tikz/row ⟨*number*⟩ (style, no value)

/tikz/every odd row (style, no value)

/tikz/every even row (style, no value)

/tikz/row ⟨*row number*⟩ column ⟨*column number*⟩ (style, no value)

/tikz/execute at begin cell=⟨*code*⟩ (no default)

/tikz/execute at end cell=⟨*code*⟩ (no default)

/tikz/execute at empty cell=⟨*code*⟩ (no default)

8.4 Anchoring a Matrix

/tikz/matrix anchor=⟨*anchor*⟩ (no default)

/tikz/anchor=⟨*anchor or node.anchor*⟩ (no default)

8.5 Considerations Concerning Active Characters

/tikz/ampersand replacement=⟨*macro name or empty*⟩ (no default)

9 Making Trees Grow

9.1 Introduction to the Child Operation

\path … child[⟨*options*⟩]foreach⟨*variables*⟩in{⟨*values*⟩}{⟨*child path*⟩} … ;

9.2 Child Paths and Child Nodes

9.3 Naming Child Nodes

9.4 Specifying Options for Trees and Children

/tikz/every child (style, initially empty)

/tikz/every child node (style, initially empty)

/tikz/level=⟨*number*⟩ (style, no default, initially empty)

/tikz/level ⟨*number*⟩ (style, initially empty)

9.5 Placing Child Nodes

9.5.1 Basic Idea

9.5.2 Default Growth Function

/tikz/level distance=⟨*distance*⟩ (no default, initially 15mm)

/tikz/sibling distance=⟨*distance*⟩ (no default, initially 15mm)

/tikz/grow=⟨*direction*⟩ (no default)

/tikz/grow'=⟨*direction*⟩ (no default)

9.5.3 Missing Children

/tikz/missing=⟨*true or false*⟩ (default true)

9.5.4 Custom Growth Functions

/tikz/growth parent anchor=⟨*anchor*⟩ (no default, initially center)

/tikz/growth function=⟨*macro name*⟩ (no default, initially an internal function)

9.6 Edges From the Parent Node

\path … edge from parent[⟨*options*⟩] …;

/tikz/edge from parent (style, initially draw)

/tikz/edge from parent path=⟨*path*⟩ (no default, initially code shown below)

/tikz/child anchor=⟨*anchor*⟩ (no default, initially border)

/tikz/parent anchor=⟨*anchor*⟩ (no default, initially border)

/tikz/edge from parent macro=⟨*macro*⟩ (no default)

10 Plots of Functions

10.1 When Should One Use TikZ for Generating Plots?

10.2 The Plot Path Operation

\path … --plot⟨*further arguments*⟩ …;

\path … plot⟨*further arguments*⟩ …;

10.3 Plotting Points Given Inline

10.4 Plotting Points Read From an External File

10.5 Plotting a Function

/tikz/variable=⟨*macro*⟩ (no default, initially x)

/tikz/samples=⟨*number*⟩ (no default, initially 25)

/tikz/domain=⟨*start*⟩:⟨*end*⟩ (no default, initially -5:5)

/tikz/samples at=⟨*sample list*⟩ (no default)

10.6 Plotting a Function Using Gnuplot

/tikz/parametric=⟨*boolean*⟩ (default `true`)

/tikz/id=⟨*id*⟩ (no default)

/tikz/prefix=⟨*prefix*⟩ (no default)

/tikz/raw gnuplot (no value)

/tikz/every plot (style, initially empty)

10.7 Placing Marks on the Plot

/tikz/mark=⟨*mark mnemonic*⟩ (no default)

/tikz/mark repeat=⟨*r*⟩ (no default)

/tikz/mark phase=⟨*p*⟩ (no default)

/tikz/mark indices=⟨*list*⟩ (no default)

/tikz/mark size=⟨*dimension*⟩ (no default)

/tikz/every mark (style, no value)

/tikz/mark options=⟨*options*⟩ (no default)

/tikz/no marks (style, no value)

/tikz/no markers (style, no value)

10.8 Smooth Plots, Sharp Plots, Jump Plots, Comb Plots and Bar Plots

/tikz/sharp plot (no value)

/tikz/smooth (no value)

/tikz/tension=⟨*value*⟩ (no default)

/tikz/smooth cycle (no value)

/tikz/const plot (no value)

/tikz/const plot mark left (no value)

/tikz/const plot mark right (no value)

/tikz/const plot mark mid (no value)

/tikz/jump mark left (no value)

/tikz/jump mark right (no value)

/tikz/jump mark mid (no value)

/tikz/ycomb (no value)

/tikz/xcomb (no value)

/tikz/polar comb (no value)

/tikz/ybar (no value)

/tikz/xbar (no value)

/tikz/ybar interval (no value)

/tikz/xbar interval (no value)

/tikz/only marks (no value)

11 Transparency

11.1 Overview

11.2 Specifying a Uniform Opacity

/tikz/draw opacity=⟨*value*⟩ (no default)

/tikz/opacity=⟨*value*⟩ (no default)

/tikz/transparent (style, no value)

/tikz/ultra nearly transparent (style, no value)

/tikz/very nearly transparent (style, no value)

/tikz/nearly transparent (style, no value)

/tikz/semitransparent (style, no value)

/tikz/nearly opaque (style, no value)

/tikz/very nearly opaque (style, no value)

/tikz/ultra nearly opaque (style, no value)

/tikz/opaque (style, no value)

/tikz/fill opacity=⟨*value*⟩ (no default)

/tikz/text opacity=⟨*value*⟩ (no default)

11.3 Fadings

11.3.1 Creating Fadings

/tikz/name={⟨*name*⟩} (no default)

\tikzfading[⟨*options*⟩]

11.3.2 Fading a Path

/tikz/path fading=⟨*name*⟩ (default scope's setting)

/tikz/fit fading=⟨*boolean*⟩ (default `true, initially true`)

/tikz/fading transform=⟨*transformation options*⟩ (no default)

/tikz/fading angle=⟨*degree*⟩ (no default)

11.3.3 Fading a Scope

/tikz/scope fading=⟨*fading*⟩ (no default)

11.4 Transparency Groups

/tikz/transparency group (no value)

12 Decorated Paths

12.1 Overview

12.2 Decorating a Subpath Using the Decorate Path Command

\path … decorate[⟨*options*⟩]{⟨*subpath*⟩} … ;

/pgf/decoration=⟨*decoration options*⟩ (no default)

/pgf/decoration/name=⟨*name*⟩ (no default, initially `none`)

12.3 Decorating a Complete Path

/tikz/decorate=⟨*boolean*⟩ (default true)

12.4 Adjusting Decorations

12.4.1 Positioning Decorations Relative to the To-Be-Decorate Path

/pgf/decoration/raise=⟨*dimension*⟩ (no default, initially 0pt)

/pgf/decoration/mirror=⟨*boolean*⟩ (no default)

/pgf/decoration/transform=⟨*transformations*⟩ (no default)

12.4.2 Starting and Ending Decorations Early or Late

/pgf/decoration/pre=⟨*decoration*⟩ (no default, initially lineto)

/pgf/decoration/pre length=⟨*dimension*⟩ (no default, initially 0pt)

/pgf/decorations/post=⟨*decoration*⟩ (no default, initially lineto)

/pgf/decorations/post length=⟨*dimension*⟩ (no default, initially 0pt)

13 Transformations

13.1 The Different Coordinate Systems

13.2 The XY- and XYZ-Coordinate Systems

/tikz/x=⟨*value*⟩ (no default, initially 1cm)

/tikz/y=⟨*value*⟩ (no default, initially 1cm)

/tikz/z=⟨*value*⟩ (no default, initially −3.85mm)

13.3 Coordinate Transformations

/tikz/shift={⟨*coordinate*⟩} (no default)

/tikz/shift only (no value)

/tikz/xshift=⟨*dimension*⟩ (no default)

/tikz/yshift=⟨*dimension*⟩ (no default)

/tikz/scale=⟨*factor*⟩ (no default)

/tikz/scale around={⟨*factor*⟩:⟨*coordinate*⟩} (no default)

/tikz/xscale=⟨*factor*⟩ (no default)

/tikz/yscale=⟨*factor*⟩ (no default)

/tikz/xslant=⟨*factor*⟩ (no default)

/tikz/yslant=⟨*factor*⟩ (no default)

/tikz/rotate=⟨*degree*⟩ (no default)

/tikz/rotate around={⟨*degree*⟩:⟨*coordinate*⟩} (no default)

/tikz/cm={⟨*a*⟩,⟨*b*⟩,⟨*c*⟩,⟨*d*⟩,⟨*coordinate*⟩} (no default)

/tikz/reset cm (no value)

13.4 Canvas Transformations

/tikz/transform canvas=⟨*options*⟩ (no default)