Ti*k*Z /PGF and other LaTeX Tricks

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Contents

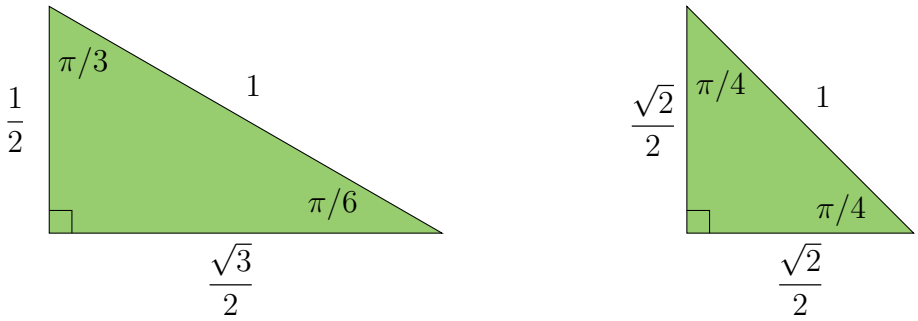
Ti*k*Z stands for Ti*k*Z ist *kein* Zeichenprogramm; PGF stands for Portable Graphics Format.

1 Resources

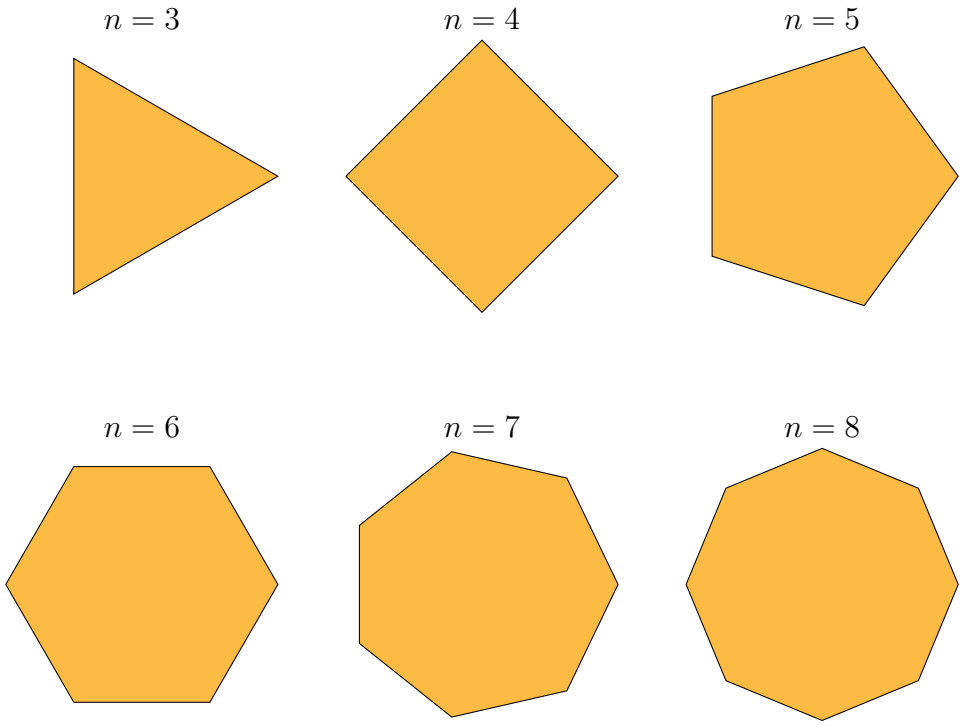
- Comprehensive Ti*k*Z Manual:
  `http://ftp.math.purdue.edu/mirrors/ctan.org/graphics/pgf/base/doc/generic/pgf/pgfmanual.pdf`
- `pgfplots` Manual:
  `http://www.bakoma-tex.com/doc/latex/pgfplots/pgfplots.pdf`
- A nice tutorial for basic drawing using Ti*k*Z :
  `http://www.math.uni-leipzig.de/~hellmund/LaTeX/pgf-tut.pdf`
- List of colors available from the `dvipsnames` package:
  `http://en.wikibooks.org/wiki/LaTeX/Colors`

2 Polygons

Here are some triangles with labels.



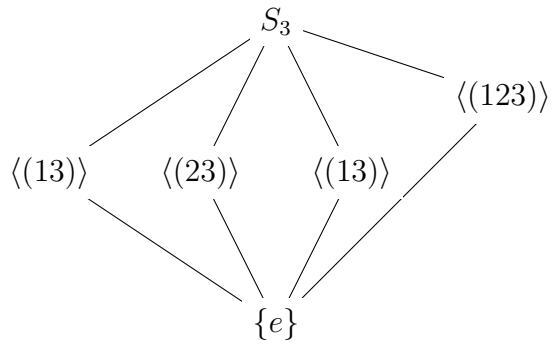
Here are some regular polygons, drawn using the `foreach` command for loops.



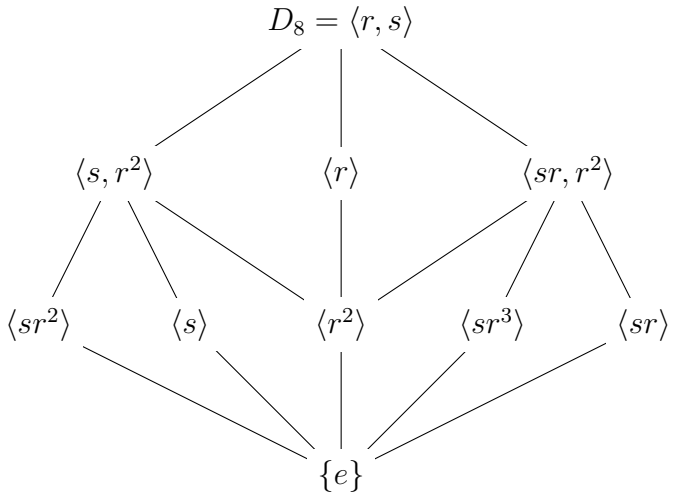
The TikZ manual has examples of how to draw pretty much any type of shape or diagram you might come up with. In particular, there's a list of cool available node shapes starting on p.435. (Forbidden sign, clouds, magnifying glass, starburst, etc.)

3 Subgroup Lattices

There is supposed to be a Ti*k*Z library (`graphs`) for typesetting graphs. However, I found it extremely difficult to get this library to work correctly (or at all!). As a result, the examples here are made using the standard Ti*k*Z nodes and lines.

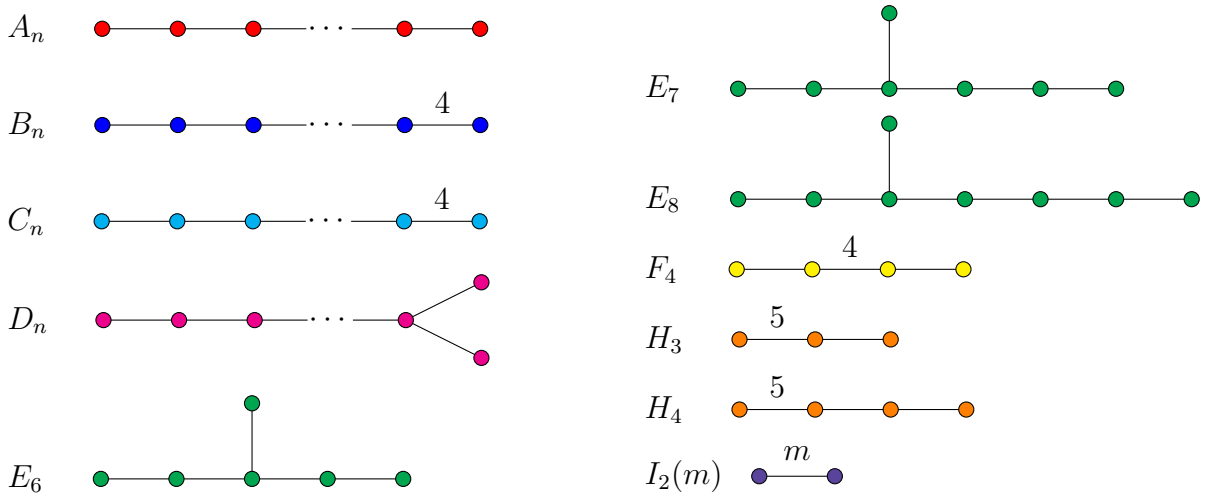


Here's a more complicated one:

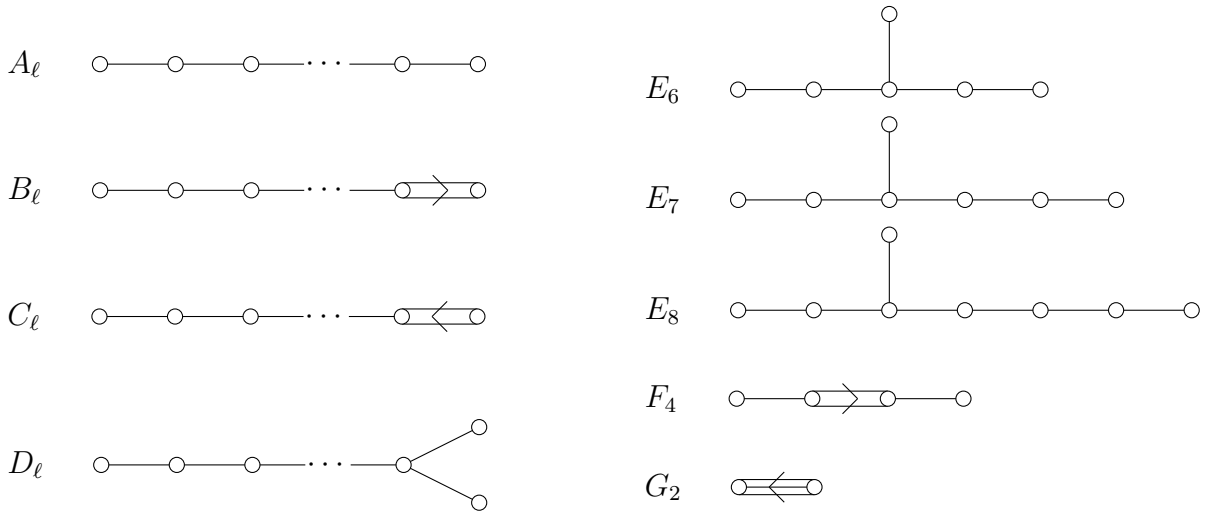


4 Coxeter graphs and Dynkin diagrams

Finite Coxeter groups can be classified by their Coxeter graphs.

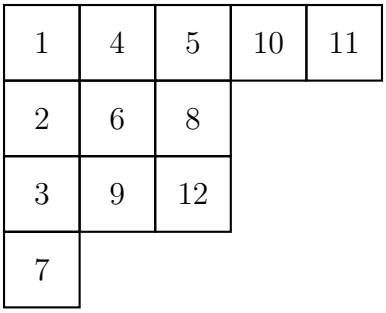


If Φ is an irreducible root system of rank ℓ, its Dynkin diagram is one of the following (ℓ vertices in each case):

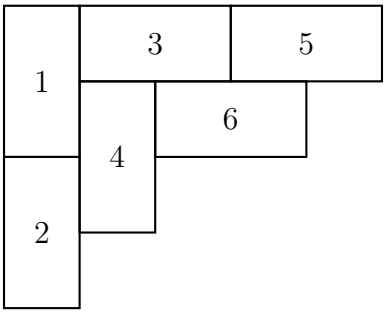


5 Tableau(x)

Here's a standard Young tableau.



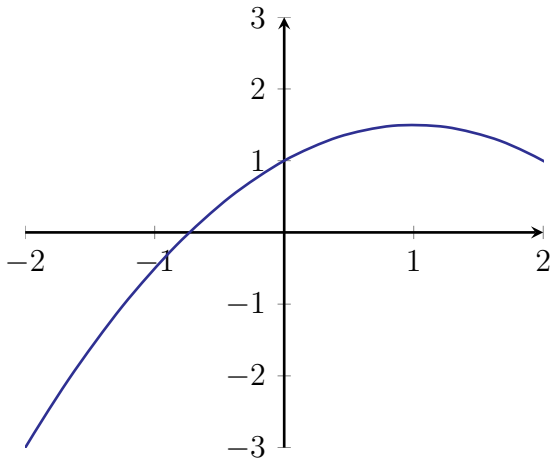
Here's a domino tableau.



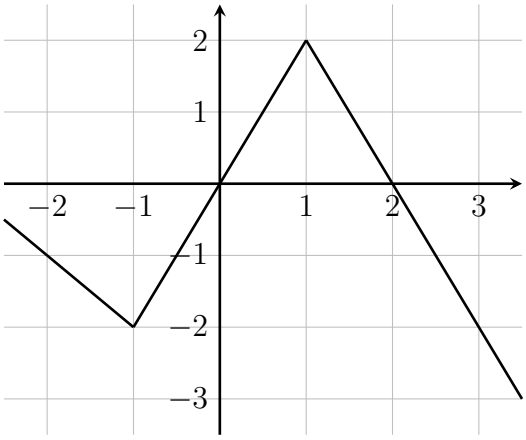
Both of these images use macros from Tyson Gern – you'll need to copy these from the header section.

6 Graphs of Functions

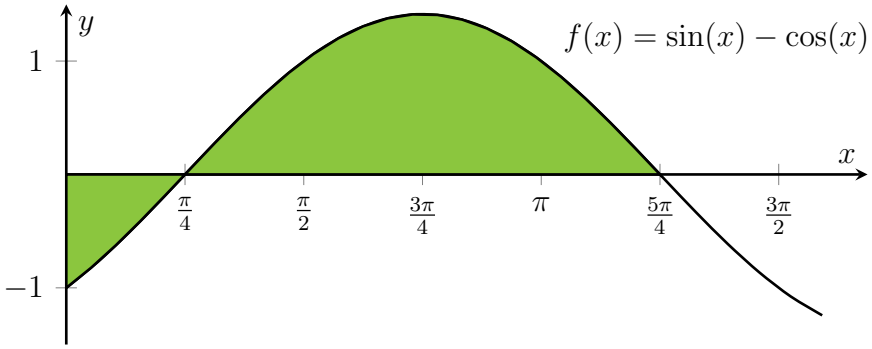
Here's a simple graph of the function $f(x) = x - \frac{x^2}{2} + 1$.



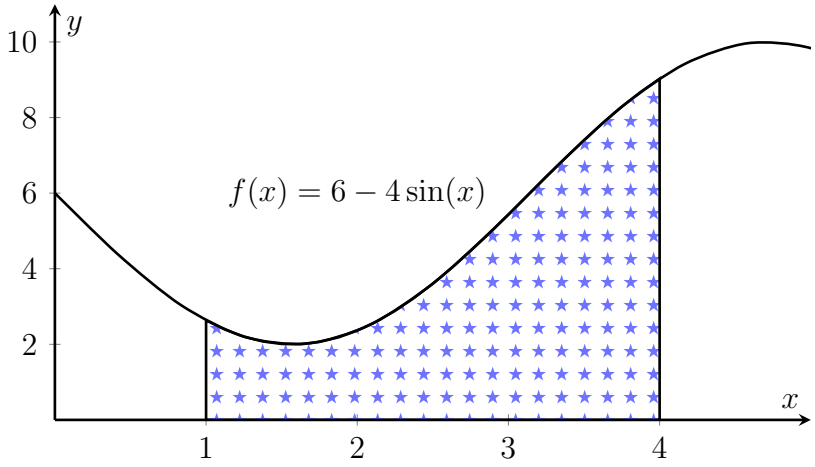
Here's a graph of a piecewise linear function, with background grid.



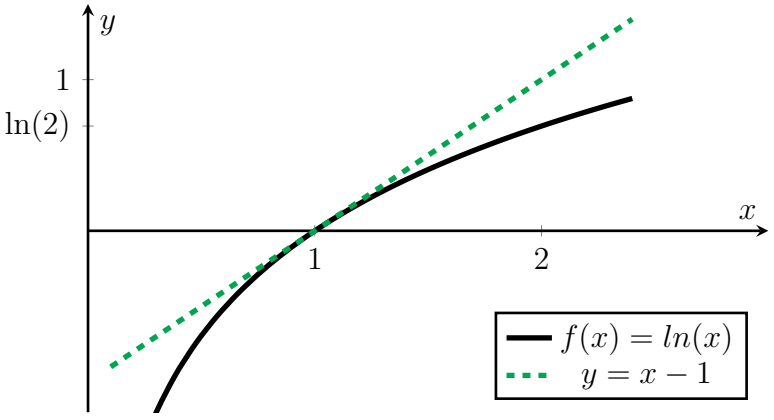
Here's a graph of $f(x) = \sin(x) - \cos(x)$, with a shaded region.



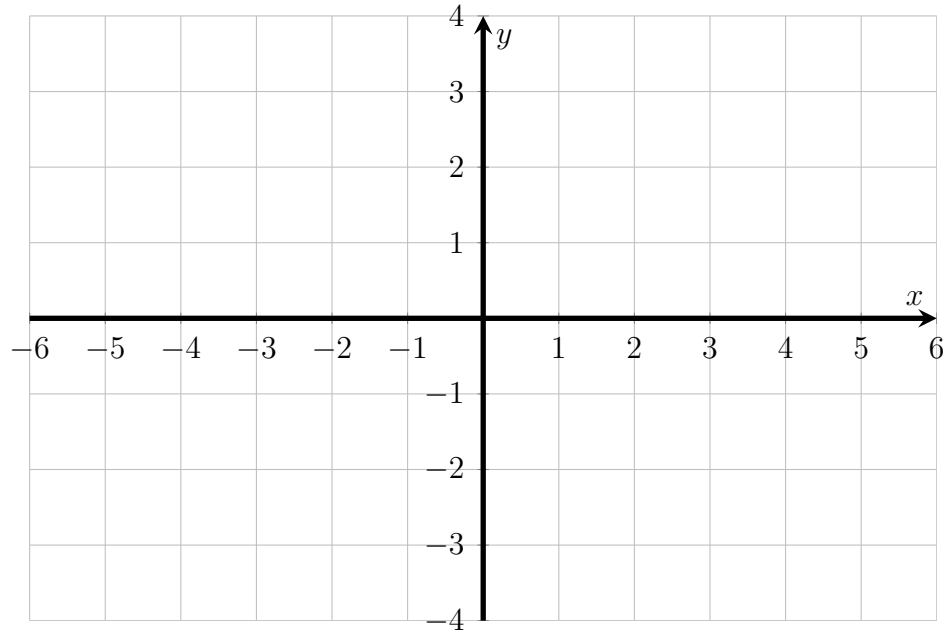
Here's another graph, this time with an annoyingly starred region. See p.393 of the Ti*k*Z manual for a list of patterns.

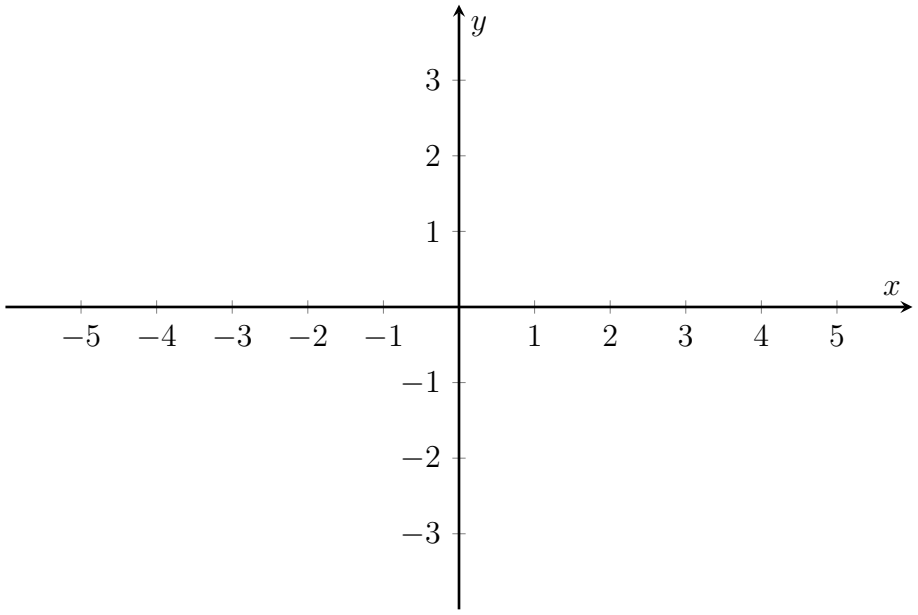


Here's a function and its tangent line. This graph has a legend.

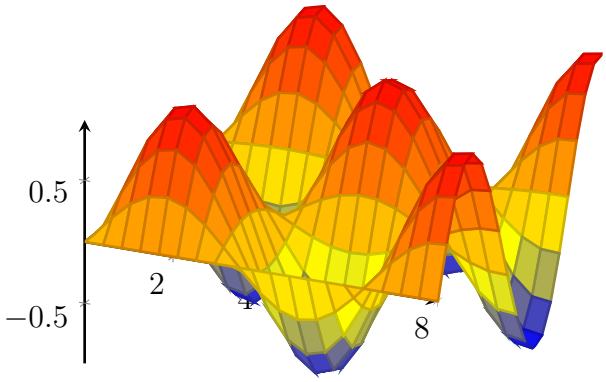


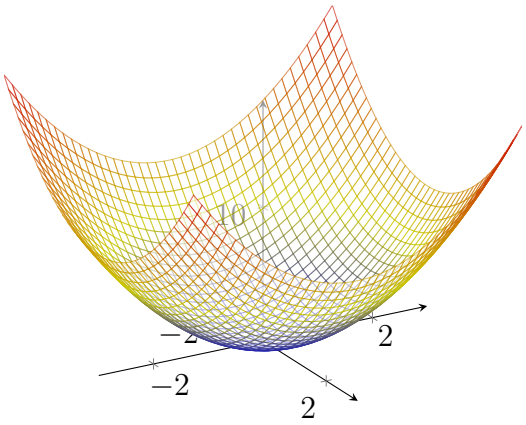
Here are some various blank axes for a student to draw a graph on.



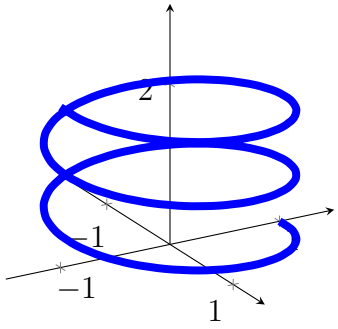


Here are some 3d graphs.

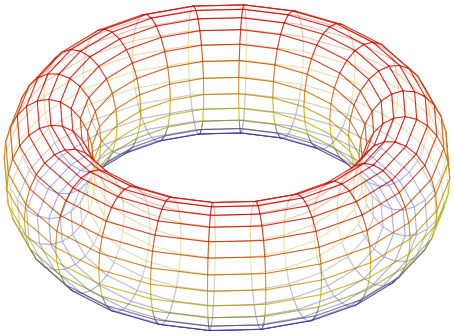




Here is a 3d plot of a parameterized curve:



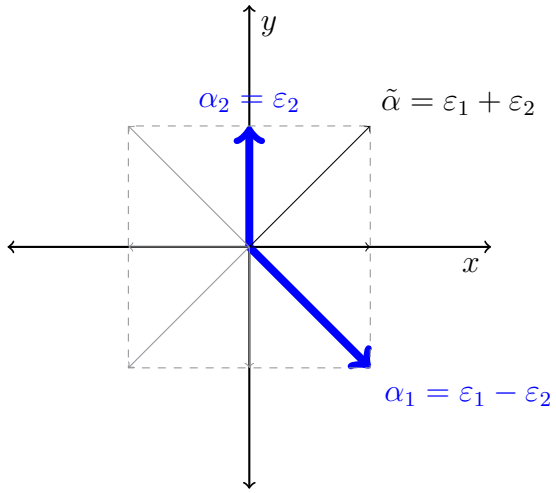
And a parameterized torus:



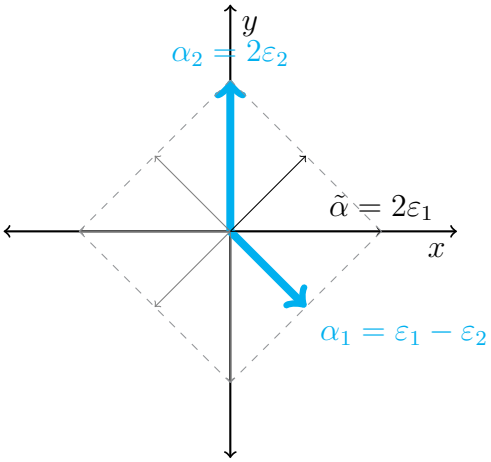
7 Vector Diagrams / Root Systems

Here are some 2d root systems.

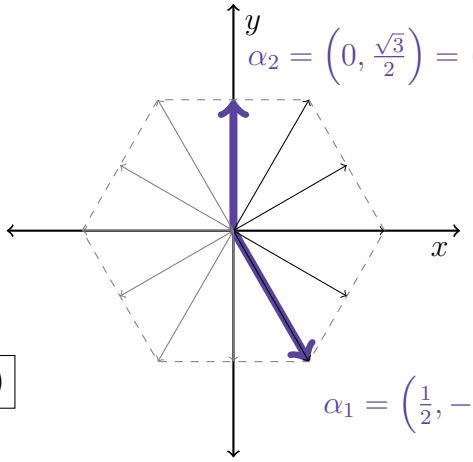
Type B_2



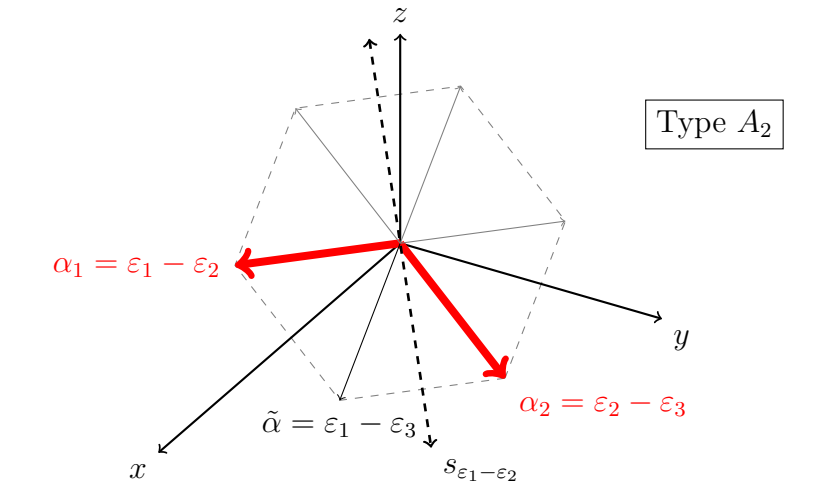
Type C_2

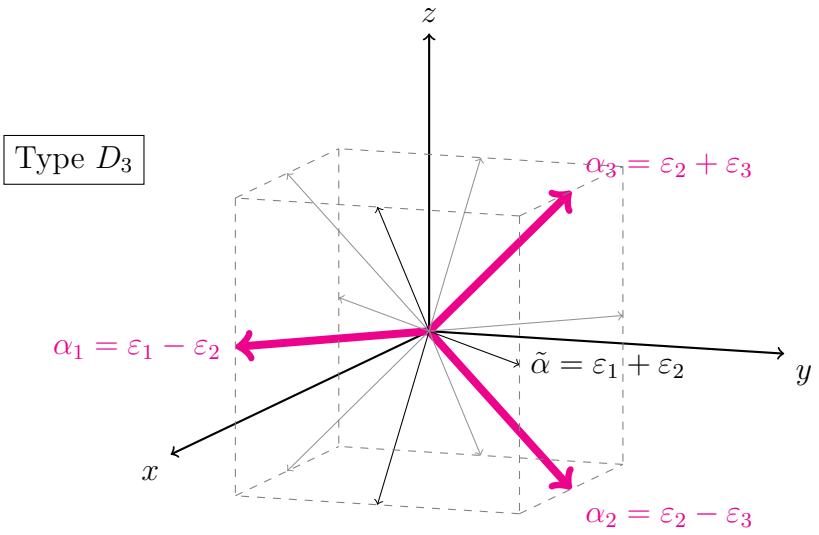


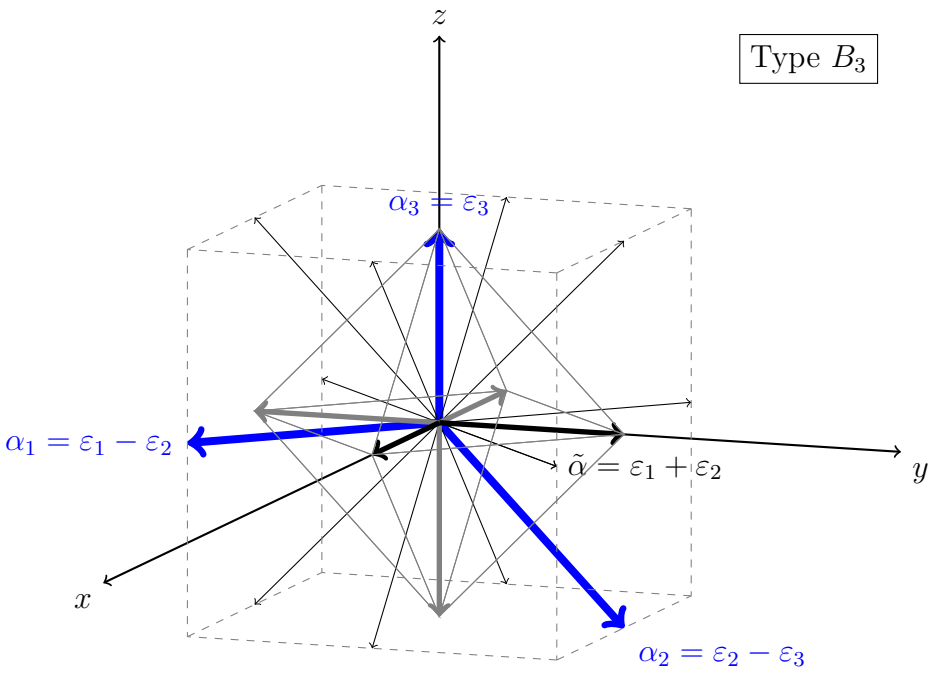
Type $I_2(6)$

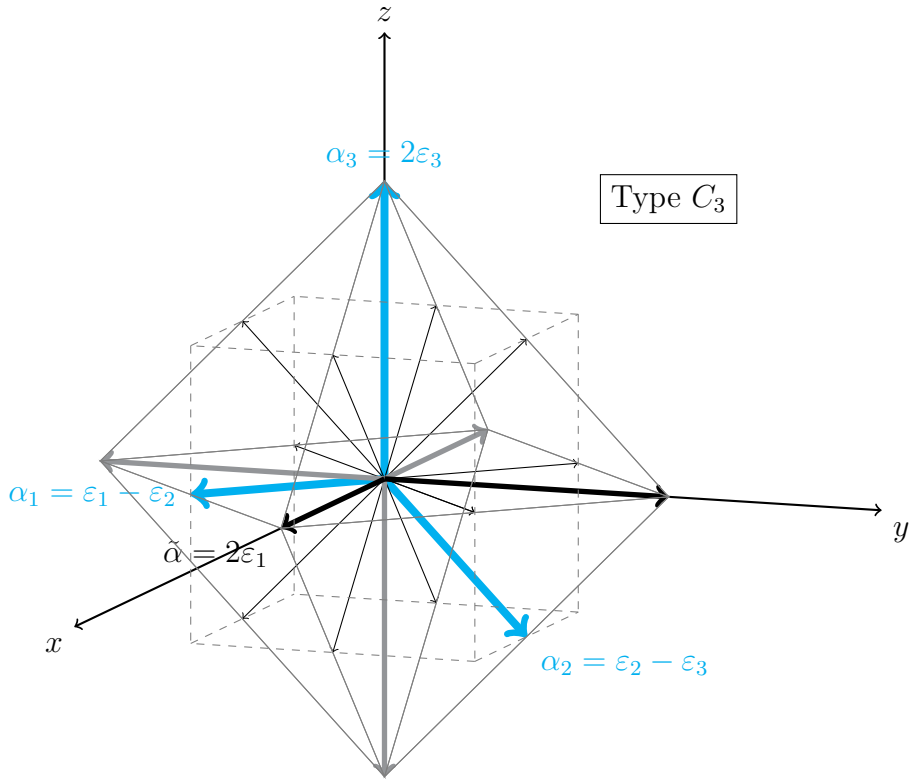


Here are some root systems in 3d, using `tikz-3dplot`.






Type B_3
z
$\alpha_3 = \varepsilon_3$
$\alpha_1 = \varepsilon_1 - \varepsilon_2$
$\tilde{\alpha} = \varepsilon_1 + \varepsilon_2$
y
x
$\alpha_2 = \varepsilon_2 - \varepsilon_3$


Type C_3
z
$\alpha_3 = 2\varepsilon_3$
$\alpha_1 = \varepsilon_1 - \varepsilon_2$
$\tilde{\alpha} = 2\varepsilon_1$
y
x
$\alpha_2 = \varepsilon_2 - \varepsilon_3$

8 Adding extra space in tables

Here's a table with a little extra height added to the columns and extra padding added in the cells:

x	0	$\pi/4$	$\pi/2$	$3\pi/4$	π
$\cos(x)$	1	$\sqrt{2}/2$	0	$-\sqrt{2}/2$	-1
$\sin(x)$	0	$\sqrt{2}/2$	1	$\sqrt{2}/2$	0