# Maple TA Plotting Guide

## Intro

Below is the basic syntax for the plot commands in Maple TA; they can be called with plotmaple(“*code*”). Replace the example functions/data as required.

## 2-D Plots

Line Plots

Plot:

“plot(x^2, x=-2..2, y=0..2)”

Complex plot:

“plot(sin(x + 8), x = -3..3)”

Implicit function plot:

“with(plots) : implicitplot(x^2 + y^2 = 1, x = -1..1, y = -1..1)”

Infinity plot:

“plot(sin(x), x = 0..infinity)”

List of values:

“with(plots) : listplot(Vector([1.2, 2.0, 3.8, 4.2, 5.0]))”

Logarithmic plot:

“with(plots) : logplot(10^x, x = 1..10)”

Parametric plot:

“plot([sin(t), cos(t), t = 0..$PI])”

Polar plot:

“with(plots) : polarplot([cos(t), sin(t), t = 0..12])”

Dual axis plot:

Plot in a different coordinate system:

“plot(sin(x), x = 0..2\*$PI, coords = *xx*)”, *where xx is the desired coordinate system*

Draw geometric object:

“with(geometry) : triangle(T, [point(A2, 0, 0), point(A1, 2, 4), point(A3, 7, 0)]) : ` draw(T)”

Draw graph/network:

“with(GraphTheory) : G := Graph(4, {{1, 2}, {3, 4}}) : DrawGraph(G)”

Algebraic curve:

“with(algcurves) : f := y^2 - x\*(x^2 - 1) : plot\_real\_curve(f, x, y, showArrows = true)”

Compare plots:

“with(plots) : plotcompare(sin(x), x^2, x = -2..2)”

Filled Plots

Contour plot:

“with(plots) : contourplot(sin(x\*y), x = -3..3, y = -3..3)”

Density plot:

“with(plots) : densityplot(sin(x\*y), x = -Pi..Pi, y = -Pi..Pi)”

Inequality plot:

“with(plots) : inequal({3 < a + b, 2\*b - a < 6, 5 < 3\*a +2\*b, a - b < 8, 0 < 3\*a + 2\*b}, a = -10..30, b = -10..15)”

Plot polygon:

Vector/Grid Plots

Plot vector:

“with(VectorCalculus) : PlotVector(<1, 2>)”

Plot spatial curve:

“with(VectorCalculus) : vec := PositionVector([p, p^2], polar) : PlotPositionVector(vec, p = 1..2\*Pi)”, *‘polar’ can be replaced with another coordinate system*

Space curve:

“with(VectorCalculus : SpaceCurve(<cos(t), sin(t), t>)”

Plot field:

“with(plots) : fieldplot([y, -sin(x) - y/10], x=-10..10, y = -10..10)”

Plot gradient field:

“with(plots) : gradplot(x^2 + y^2 + 1, x=-1..1, y = -1..1)”

Plot direction field:

Plot vector field:

Conformal plot:

“with(plots) : conformal(z^2, z = 0..2 + 2\*I)”

Show coordinate system:

“with(plots) : coordplot(*xx*)”, *where xx is the desired coordinate system*

Point Plots

Plot sparse matrix:

“with(plots) : with(LinearAlgebra) : M := <1, 2, 3|4, 5, 6|7, 8, 9> : sparsematrixplot(M)”

## 3-D Plots

Line and Point Plots

Plot knot:

“with(algcurves) : plot\_knot(y^2 - x^3, x, y)”

Space curve:

“with(VectorCalculus) : SpaceCurve(<cos(t), sin(t), t>, t = 1..9)”

Draw graph/network:

Plot 3-D point:

“with(plots) : A := {[0, 1, 1], [1, -1, 2], [3, 0, 5]} : pointplot3d(A, axes=normal)”

Filled Plots

Plot 3-D:

"plot3d(sin(x + y), x = -1..1, y = -1..1)”

Complex plot 3-D:

“with(plots) : complexplot3d([x^2 - y^2, 2\*x\*y], x = -2..2, y = -2..2)”

Draw geometric object 3-D:

Implicit plot 3-D:

“with(plots) : implicitplot3d(x^2 - y^2 + z^2, x = -2..2, y = -2..2, z = -2..2)”

Plot intersection:

“with(plots) : intersectplot(x^2 + y^2 + z^2 = 1, x^2 - y^2 = z\*(z - 1), x = -2..2, y = -2..2, z = -2..2)”

Plot matrix values:

"with(plots) : with(LinearAlgebra) : A := <1, 2| 3, 4> : matrixplot(A)”

Plot polyhedra:

Plot tube:

“with(plots) : tubeplot([cos(t), sin(t), 0], t = 0..2\*Pi)”

Contour plot 3-D:

“with(plots) : f := x^2 + y^2 : contourplot3d(f, x= -1..1, y = -1..1)”

Compare plots:

Vector/Grid Plots

Plot vector (3-D):

“with(VectorCalculus) : vec := [<1, -1, 7>] : PlotVector(vec)”

Plot spatial curve (3-D):

Plot surface:

Plot field (3-D):

Plot gradient field (3-D):

Conformal plot (3-D):

Show 3-D coordinate system:

“with(plots) : coordplot3d(*xx*)”, *where xx is the desired coordinate system*

3-D plot in different coordinate system:

“plot3d(sin(x + y), x = -1..1, y = -1..1, coords=*xx*)” , *where xx is the desired coordinate system*

## Statistical and Financial Plots

Agglomerated plot:

“with(Statistics) : data := Sample(RandomVariable(Normal(0,1)), 100) : AgglomeratedPlot(data)”

Agglomerated plot (3D):

“with(Statistics) : A := Sample(RandomVariable(Normal(0, 1)), 50) : B := Sample(RandomVariable(Normal(0, 1)), 50) : C := Sample(RandomVariable(Normal(0, 1)), 50) : AgglomeratedPlot(A, B, C)”

Area chart:

“with(Statistics) : A := <1, 2, 3, 4, 2, 3, 1> : B := <1, 5, 1, 0, 2, 1, 1> : C := <1, 2, 1, 3, 1, 4, 2> : : AreaChart([A, B, C], format = stacked)”

Area chart (3D):

“with(Statistics) : A := <1, 2, 3, 4, 2, 3, 1> : B := <1, 5, 1, 0, 2, 1, 1> : C := <1, 2, 1, 3, 1, 4, 2> : : AreaChart([A, B, C])”

Bar chart:

“with(Statistics) : A := <1, 2, 3, 4, 2, 3, 1> : B := <1, 5, 1, 0, 2, 1, 1> : C := <1, 2, 1, 3, 1, 4, 2> : BarChart([A, B, C])”

Box plot:

“with(Statistics) : A := Sample(RandomVariable(Normal(0, 1)), 20) : BoxPlot(A)”

Bubble plot:

“with(Statistics) : A := <1, 2, 3, 4, 2, 3, 1> : B := <1, 5, 1, 0, 2, 1, 1> : C := <1, 2, 1, 3, 1, 4, 2> : BubblePlot(A, B, C)”

Column graph:

“with(Statistics) : A := <1, 2, 3, 4, 2, 3, 1> : B := <1, 5, 1, 0, 2, 1, 1> : C := <1, 2, 1, 3, 1, 4, 2> : ColumnGraph([A, B, C])”

Cumulative sum chart:

“with(Statistics) : A := <1, 2, 3, 4, 2, 3, 1> : B := <1, 5, 1, 0, 2, 1, 1> : C := <1, 2, 1, 3, 1, 4, 2> : CumulativeSumChart([A, B, C])”

Error plot:

“with(Statistics) : A := Sample(RandomVariable(Normal(0, 1)), 20) : B := A : C := A : ErrorPlot(A, xerrors = B, yerrors = C)”

Frequency plot:

“with(Statistics) : N := RandomVariable(Normal(0, 1)) : A := Sample(N, 100) : FrequencyPlot(A)”

Histogram:

“with(Statistics) : A := Sample(RandomVariable(Normal(0, 1)), 20) : Histogram(A)”

Kernel density:

“with(Statistics) : A := Sample(RandomVariable(Normal(0, 1)), 20) : KernelDensityPlot(A)”

Line chart:

“with(Statistics) : A := <1, 2, 3, 4, 2, 3, 1> : B := <1, 5, 1, 0, 2, 1, 1> : C := <1, 2, 1, 3, 1, 4, 2> : LineChart([A, B, C])”

Pareto:

Pie chart:

“with(Statistics) : T := [1, 2, 3, 2, 1] : PieChart(T)”

Plot point:

“with(Statistics) : A := <1, 2, 3, 4, 2, 3, 1> : B := <1, 5, 1, 0, 2, 1, 1> : C := <1, 2, 1, 3, 1, 4, 2> : PointPlot([A, B, C])”

Probability plot:

“with(Statistics) : A := Sample(RandomVariable(Normal(0, 1)), 20) : B := Normal(0, 1) : ProbabilityPlot(A, B)”

Profile of likelihood:

“with(Statistics) : S := Sample(RandomVariable(Normal(5, 7)), 100) : R := RandomVariable(Normal(5, c)) : ProfileLikelihood(R, S)”

Plot quantile:

“with(Statistics) : A := Sample(RandomVariable(Normal(0, 1)), 100) : B := Sample(RandomVariable(Normal(0, 1)), 100) : QuantilePlot(A, B)”

Scatterplot:

“with(Statistics) : A := Sample(RandomVariable(Normal(0, 1)), 100) : B := Sample(RandomVariable(Normal(0, 1)), 100) : ScatterPlot(A, B)”

Sunflower plot:

“with(Statistics) : A := Sample(RandomVariable(Normal(0, 1)), 100) : B := Sample(RandomVariable(Normal(0, 1)), 100) : SunflowerPlot(A, B)”

Surface plot of data:

“with(Statistics) : A := <1, 2, 3, 4, 2, 3, 1> : B := <1, 5, 1, 0, 2, 1, 1> : C := <1, 2, 1, 3, 1, 4, 2> : SurfacePlot(A, B, C)”

Symmetry plot:

“with(Statistics) : A := [1.1, 1.4, 2.0, 2.6] : SymmetryPlot(A)”

Path of a Stochastic Process:

Tree plot:

## Packages

With(plots)

With(Statistics)

With(algcurves)

With(VectorCalculus)

## Notes

* When plotting a function, do not use 3x, 2a, etc. While this syntax works in Maple itself, it doesn’t work with the plotmaple command. Always use 3\*x, 2\*a, etc.
* Pay close attention to syntax, especially when dealing with the types of brackets being used. Any typo will result in a broken plot, with no hint of what went wrong.
* When in doubt, copy and paste the commands directly into Maple and check to make sure that it runs properly. If it does, then make sure that your syntax matches with that expected by Maple TA. If it doesn’t, then Maple produces better error messages than Maple TA does.