Useful Alpha Commands

For Vector Calculus

\[(a_1,a_2,a_3) \text{ dot } (b_1,b_2,b_3)\]
\[(a_1,a_2,a_3) \text{ cross } (b_1,b_2,b_3)\]
\[||(a_1,a_2,a_3)||\]

\[v = (1,-2,1); w = (1,1,-2); v \text{ dot } w\]
\[v = (1,-2,1); w = (1,1,-2); v \text{ cross } w\]
\[v = (1,-2,1); w = (1,1,-2); \cos((v \text{ dot } w)/(||v||*||w||))\]

parametric plot \((1,2,3) + t*(-1,1,2)\) (* line *)
plot \(x + 2*y - 3*z = 1\) (* plane *)

(* helix *)
parametric plot \((10*\cos(t),10*\sin(t),t), 0<t<8*\pi\)

(* quadratic surfaces: *)
plot \(x^2 + y^2 + z^2 = 1\)
plot \(z = x^2 + y^2\)
plot \(z = x^2 - y^2\)
plot \(z^2 = x^2 + y^2\)
plot \(x^2 + y^2 - z^2 = 1\)
plot \(x^2 + y^2 - z^2 = -1\)

(* \(f_{xy} \neq f_{yx}\) *)
plot \((x^3*y - x*y^3)/(x^2 + y^2)\)
d/dx ( d/dy (x^3*y - x*y^3)/(x^2 + y^2) )
d/dy ( d/dx (x^3*y - x*y^3)/(x^2 + y^2) )
limit as \(x->0\) of d/dx ( d/dy (x^3*y - x*y^3)/(x^2 + y^2) )
limit as \(y->0\) of d/dy ( d/dx (x^3*y - x*y^3)/(x^2 + y^2) )

plot \((2*x,3*y)\) for \(-0.1<x<1.1, -0.1<y< 2.1\)
plot \((x,y)/(x^2+y^2)\)
plot \((-y,x)\)
plot \((x,y,z)/(x^2+y^2+z^2)\)
plot \((-y,x,0)/(x^2+y^2)\)
curl (curl F)
div (curl F)
curl (grad f)

vector field plot \((\sin(x) \cos(y), -\cos(x) \sin(y))\) for \(-\pi < x < \pi\) and \(-\pi < y < \pi\)
vector field plot \((\exp(x) \cos(y), -\exp(x) \sin(y))\)

plot \((y, x)\)
plot grad \(x \times y\)
plot grad \((x + x/(x^2 + y^2))\) for \(-2 < x < 2\) and \(-2 < y < 2\)
plot \(u(x, y) = x^2 - 1\) for \(-1 < x < 1\) and \(-1 < y < 1\)
plot grad \((y + y/(2*(x^2 + y^2)^{1.5}))\) for \(-2 < x < 2\) and \(-2 < y < 2\)
plot \(\sin(3\pi x/2), -\sin(3\pi x/2)/2\) for \(0 < x < 1\)
plot \(\sin(3\pi x), -\sin(3\pi x)/2\) for \(0 < x < 1\)

For Numerical Analysis

taylor series in \(d\) for \(2*d*((1-g)*u'(t) - u'(t+g*d) + g*u'(t+d))/(g*(1-g))\)
find extrema of \((-3*g^2 + 4*g - 2)/(12*(2 - g))\)
integrate \(\exp(-x^2/(4*t))/\sqrt{4\pi t}\) from \(-\infty\) to \(+\infty\)