Useful Alpha Commands

For Vector Calculus

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

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

parametric plot \((1,2,3) + t*(-1,1,2)\) (* line *)

plot \(x + 2y - 3z = 1\) (* plane *)

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

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

parametric plot \(t+\cos(t),t-\sin(t)\), \(0 < t < 8*pi\) (* uphill cycloid *)

(* 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 != 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 \(x\to0\) of \(d/dx \ (d/dy \ (x^3*y - x*y^3)/(x^2 + y^2))\)

limit as \(y\to0\) 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))

plot (y,x)

plot grad $x*y$

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 $-\text{Infinity}$ to $+\text{Infinity}$