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mvcal2: Maple commands for vector calculus

Based on the calcplot-based worksheet, examplesR3.ms, prepared by Tim Murdoch, 1994).

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17 Feb 1997

```
> restart;
> with( plots ):
> setoptions( labels=['x','y'] ):
> setoptions3d( labels=['x','y','z'] ):
```

Note: availability of mvcal2

```
> with( mvcal2 );
```

[*angle*, *approxint2d*, *arrow*, *blockapp*, *cyldemo*, *demo*, *dphidrhodtplot*, *dphidtdrhoplot*, *drawcone*, *drawcrossprod*, *drawcrossproduct*, *drawdird*, *drawdirquo*, *drawellipsoid*, *draweparaboloid*, *drawgradient*, *drawhparaboloid*, *drawhyperboloid1*, *drawhyperboloid2*, *drawplane*, *drawpoint*, *drawpyramid*, *drawsolid*, *drawvector*, *drawvector3d*, *drawvectorfield*, *drawvectorfield3d*, *drawvfgraph*, *drawvfsurface*, *drdtdzplot*, *drdtplot*, *drdzdtplot*, *drhodphidtplot*, *drhodtdphiplot*, *dtdphidrhoplot*, *dtdrdzplot*, *dtdrhodphiplot*, *dtdrplot*, *dtdzdrplot*, *dxdydzplot*, *dxdyplot*, *dxdzdyplot*, *dydxdzplot*, *dydxplot*, *dydzdxplot*, *dzdrdtplot*, *dzdtdrplot*, *dzdxdyplot*, *dzdydxplot*, *eg*, *ex*, *fluxintegral*, *lagrange*, *levelcurve*, *levelsurface*, *lineintegral*, *monte1*, *monte2dxdy*, *monte2dydx*, *plotvectorfield*, *plotvectorfield3d*, *poly*, *regionplot2d*, *regionplot3d*, *rhandtest*, *sphdemo*, *tableofvalue*, *tracecurve*, *tracespacecurve*, *vectlength*, *velocitydemo*, *xsliceapp*, *ysliceapp*]

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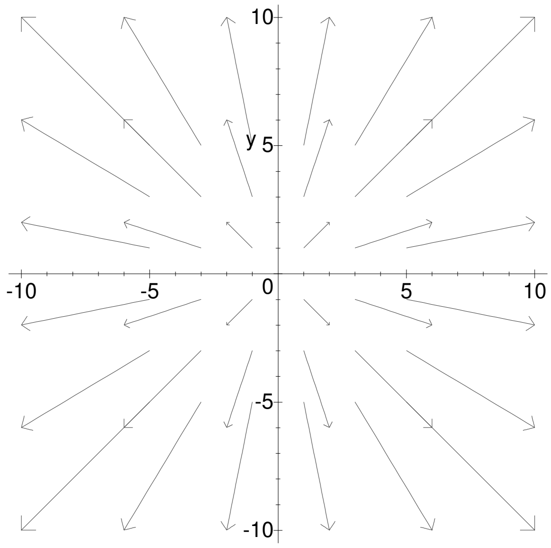
Plotting of Vector Fields

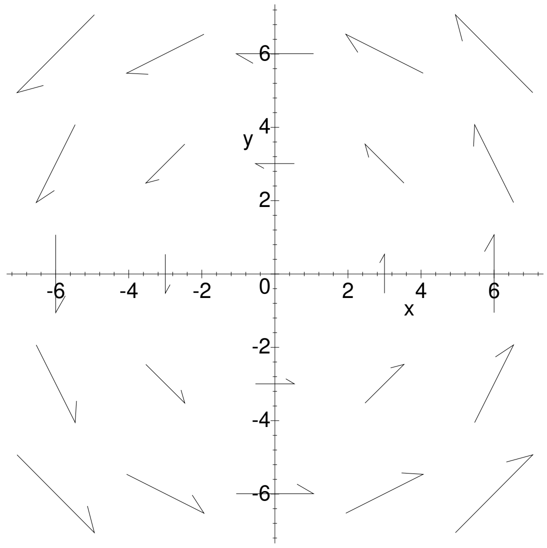
1. plotvectorfield and plots[fieldplot]

Two-dimensional vectors can be displayed by specifying the two components of F, the ranges for the two variables, and the spacing between vectors (see also plots[fieldplot]).

```
> plotvectorfield( [x,y], x=-5..5, y=-5..5, 2 );
```




```
> fieldplot( [x,y], x=-5..5, y=-5..5, grid=[6,6] );
> plotvectorfield( [-y,x], x=-6..6, y=-6..6, 3 );
> fieldplot( [-y,x], x=-6..6, y=-6..6, grid=[5,5] );
```

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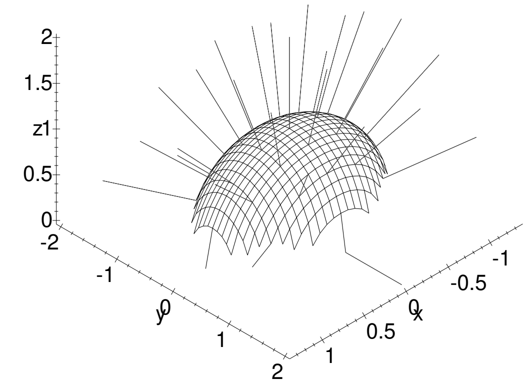
2. plotvectorfield3d and plots[fieldplot3d]

```
> plotvectorfield3d( [2*x,2*y,1], x=-1..1, y=-1..1, 0.4, z=-1..1,
  layers=5 );
> fieldplot3d([2*x,2*y,1],x=-1..1,y=-1..1,z=-1..1,grid=[5,5,5]);
> plotvectorfield3d([y*z,-x*z,x*y],x=-5..5,y=-5..5,0.5,z=0..1,layers
  =4);
>
```

3. drawvfgraph and drawvfsurface

```
> drawvfgraph(z=sqrt(1-x^2-y^2),[x,y,z],x=-1..1,y=-1..1);
```




```
> drawvfsurface([p*cos(q),p*sin(q),p^2],[y,x+2*y,z-2*x],p=0..2,q=0..
  2*Pi);
>
```

Curves in 2- and 3-dimensions

4. tracecurve (animated graphing of a curve in 2-D)

5. tracespacecurve (animated graphing of a curve in 3-D)

6. velocitydemo

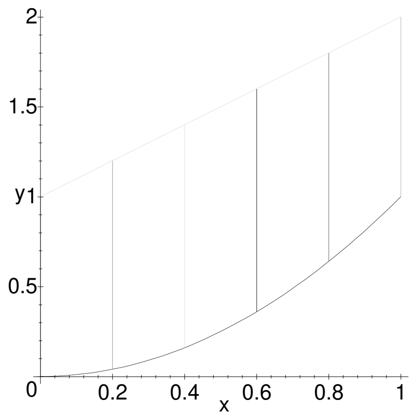
Two-Dimensional Regions and Surfaces above 2-D Regions

7. dxdyplot and dydxplot

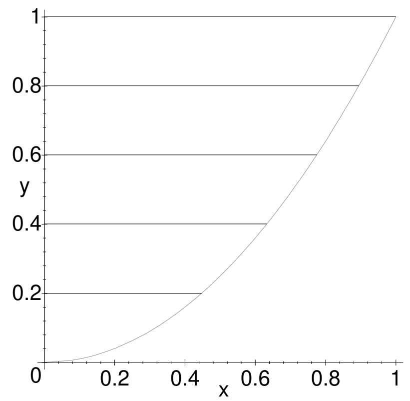
Use dxdyplot to plot a <u>horizontally-simple</u> domain of the form: $\phi_1(y) <= x <= \phi_2(y)$, $a <= y <= b$.

Use dydxplot to plot a <u>vertically-simple</u> domain of the form: $\phi_1(x) <= y <= \phi_2(x)$, $a <= x <= b$.

```
> dydxplot( y=x^2..x+1, x=0..1 );
```




```
> dxdyplot( x=0..sqrt(y), y=0..1 );
```




```
> dydxplot( y=x^2..1, x=0..1 );
> dydxplot( y=0..2*x+1, x=0..1, view=[-1..2,0..4], title=`A
  trapezoidal region` );
>
```

8. drdtplot and dtdrplot

9. drawsolid (xygraphplot and yxgraphplot in calcplot)

Three-Dimensional Regions

10. dxdydzplot, dxdzdyplot, dydxdzplot, dydzdxplot, dzdxdyplot, and dzdydxplot

11. drdtdzplot, drdzdtplot, dtdrdzplot, dtdzdrplot, dzdrdtplot, and dzdtdrplot

12. drhodtdphiplot, drhodphidtplot, dphidrhodtplot, dphidtdrhoplot, dtdphidrhoplot, and dtdrhodphiplot

Double Integrals: Riemann sums and slices

13. blockapp

14. xsliceapp and ysliceapp

15. approxint2d

Other Commands in mvcal2

For a full list of commands and additional information on mvcal2, consult the links to the on-line help.

```
>
```