Contour Plots

This Maple session gives some examples of creating contour plots.

First, load the "plots" library:

```maple
> with(plots):
```

Define an expression to hold \( f(x,y) \). We'll do a contour plot for \( f(x,y) = x^2 + 2y^2 \).

```maple
> f := x^2 + 2*y^2;
```

The `contourplot` command creates a contour plot. The first argument is the function; the second and third arguments are the x and y ranges, respectively.

```maple
> contourplot(f,x=-1..1,y=-1..1);
```

After the first three arguments, you can include many optional arguments. The following are just a small sample.

You can specify the exact number of contours to draw with "contours=N" (replace N with the number). The default is 8.

OR, you can specify the actual contour values to be used to create the contour lines with "contours=[z1,z2,...,zn]". For example, the option `contours=[0,0.5,1.5,2,2.5]` would create a contour plot with the six given contour values.
You can change the color of the contour lines; for example, "color=green".

You can force the plot to use the same scaling on the x and y axes (so a circle really looks like a circle) with "scaling=constrained".

If the curves in the contour plot look jagged, you can increase the resolution with the option "grid=[Nx,Ny]", where you replace Nx and Ny with integers that give the x and y resolutions. The default is [25,25].

Here are some examples that use these options:

```maple
> contourplot(f, x=-1..1, y=-1..1, contours=21, color=blue, scaling=constrained);
```

```maple
> g := x^2-y^2+y^3;

> contourplot(g, x=-1..1, y=-1..1, contours=[-0.4,-0.2,0,0.2,0.4], grid=[41,41], scaling=constrained);
```