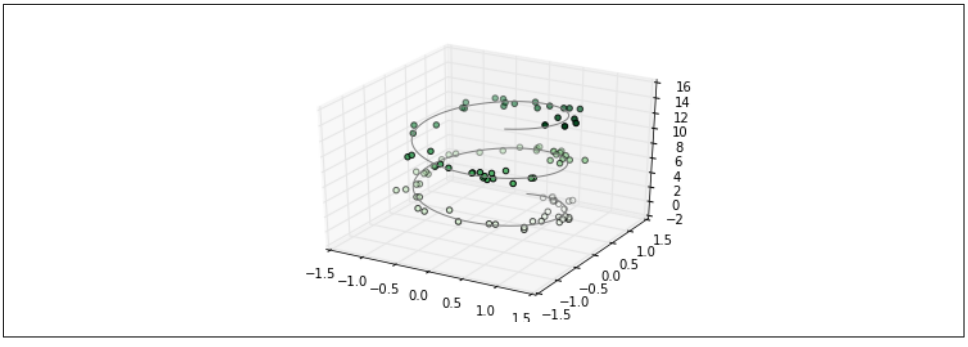

Figure 4-93. Points and lines in three dimensions

Notice that by default, the scatter points have their transparency adjusted to give a sense of depth on the page. While the three-dimensional effect is sometimes difficult to see within a static image, an interactive view can lead to some nice intuition about the layout of the points.

Three-Dimensional Contour Plots

Analogous to the contour plots we explored in "Density and Contour Plots" on page 241, `mplot3d` contains tools to create three-dimensional relief plots using the same inputs. Like two-dimensional `ax.contour` plots, `ax.contour3D` requires all the input data to be in the form of two-dimensional regular grids, with the Z data evaluated at each point. Here we'll show a three-dimensional contour diagram of a three-dimensional sinusoidal function (Figure 4-94):

```
In[5]: def f(x, y):
           return np.sin(np.sqrt(x ** 2 + y ** 2))

       x = np.linspace(-6, 6, 30)
       y = np.linspace(-6, 6, 30)

       X, Y = np.meshgrid(x, y)
       Z = f(X, Y)
```

```
In[6]: fig = plt.figure()
       ax = plt.axes(projection='3d')
       ax.contour3D(X, Y, Z, 50, cmap='binary')
       ax.set_xlabel('x')
       ax.set_ylabel('y')
       ax.set_zlabel('z');
```

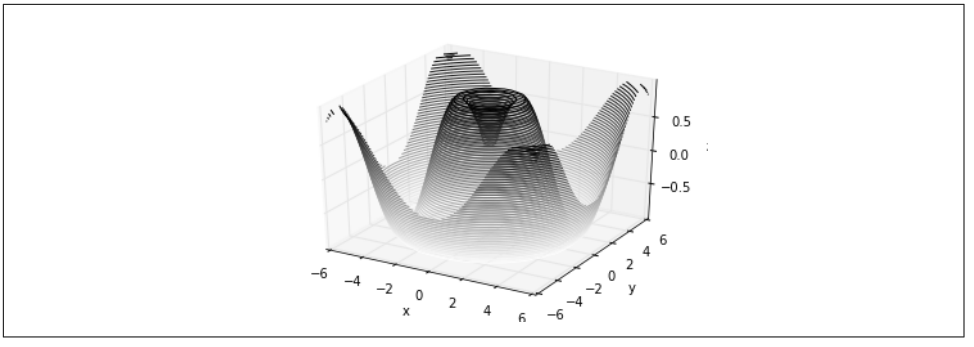

Figure 4-94. A three-dimensional contour plot

Sometimes the default viewing angle is not optimal, in which case we can use the `view_init` method to set the elevation and azimuthal angles. In this example (the result of which is shown in Figure 4-95), we'll use an elevation of 60 degrees (that is, 60 degrees above the *x*-*y* plane) and an azimuth of 35 degrees (that is, rotated 35 degrees counter-clockwise about the *z*-axis):

```
In[7]: ax.view_init(60, 35)
       fig
```

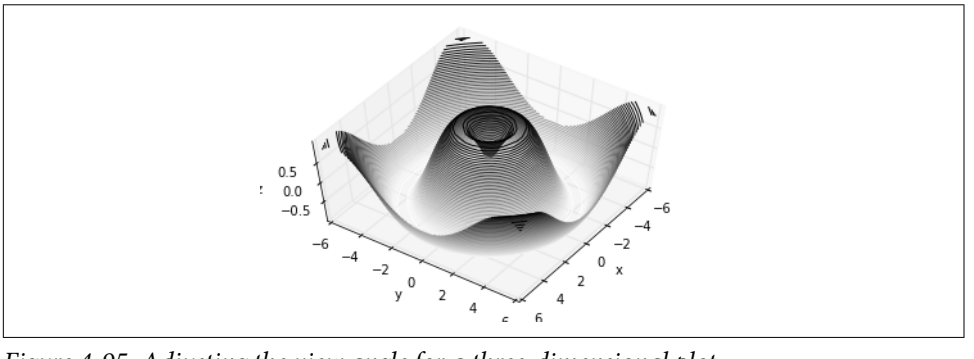

Figure 4-95. Adjusting the view angle for a three-dimensional plot

Again, note that we can accomplish this type of rotation interactively by clicking and dragging when using one of Matplotlib's interactive backends.

Wireframes and Surface Plots

Two other types of three-dimensional plots that work on gridded data are wireframes and surface plots. These take a grid of values and project it onto the specified three-dimensional surface, and can make the resulting three-dimensional forms quite easy to visualize. Here's an example using a wireframe (Figure 4-96):