A. Plotting Curves in 3D

The command `plot3` is the 3D analog of the command `plot`. Here is an example, taken from Section 10.7 of the textbook.

```matlab
t = linspace(0, 10*pi, 1000);
x = t.*sin(5*t);
y = t.*cos(5*t);
z = t;
plot3(x,y,z)
```

If you click on the toolbar icon to the right of the hand, you can rotate the graph and view it from different angles.

B. Plotting Graphs of Functions of Two Variables

The commands `surf` and `mesh` can be used to generated a graph of a function of two variables. Here is an example displaying the graph of \( z = \sin(2\pi xy) \) over the square \(-1 \leq x \leq 1, \ -1 \leq y \leq 1\).

```matlab
xArray = linspace(-1, 1, 50);
yArray = xArray;
[x, y] = meshgrid(xArray, yArray);
z = sin(2*pi*x.*y);
surf(x, y, z)
```

If you click on the toolbar icon to the right of the hand, you can rotate the graph and view it from different angles. Try the command

```matlab
mesh(x, y, z)
```

to see what it does.

C. Plotting Surfaces Described Parametrically

Here is an example displaying the graph of the surface described parametrically by the equations \( x = \sin(\phi) \cos(\theta) , \ y = \sin(\phi) \sin(\theta) , \ z = \cos(\phi) \) for \( 0 \leq \theta \leq \pi , \ 0 \leq \phi \leq \pi/2\).

```matlab
theta=linspace(0,pi,20);
phi=linspace(0,pi/2,20)'; % Don’t forget the ’
x=sin(phi)*cos(theta);
y=sin(phi)*sin(theta);
z=cos(phi)*ones(size(theta));
surf(x,y,z)
```

D. Practice Problems

1. Plot the curve given by the parametric equations \( x = \cos(2t), \ y = \sin(2t), \ z = \cos(3t) \) for \( 0 \leq t \leq 6\pi \).

2. Graph the surface given by \( z = 4 - x^2 - y^2 \) for \( -1 \leq x \leq 1, \ -1 \leq y \leq 1 \).