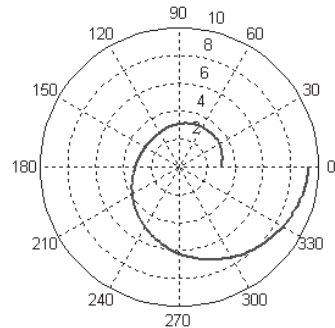For example, a plot of the function $r = 3\cos^2(0.5\theta) + \theta$ for $0 < \theta < 2\pi$ is shown below.


```
t=linspace(0,2*pi,200);
r=3*cos(0.5*t).^2+t;
polar(t,r)
```

5.10 PUTTING MULTIPLE PLOTS ON THE SAME PAGE

Multiple plots can be created on the same page with the subplot command, which has the form:

$$\boxed{\texttt{subplot(m,n,p)}}$$

The command divides the Figure Window (and the page when printed) into $m \times n$ rectangular subplots. The subplots are arranged like elements in an $m \times n$ matrix where each element is a subplot. The subplots are numbered from 1 through $m \cdot n$. The upper left subplot is numbered 1, and the lower right subplot is numbered $m \cdot n$. The numbers increase from left to right within a row, from the first row to the last. The command subplot(m,n,p) makes the subplot p current. This means that the next plot command (and any formatting commands) will create a plot (with the corresponding format) in this subplot. For example, the command subplot(3,2,1) creates six areas arranged in three rows and two columns as shown, and makes the upper left subplot current. An example of using the subplot command is shown in the solution of Sample Problem 5-2.
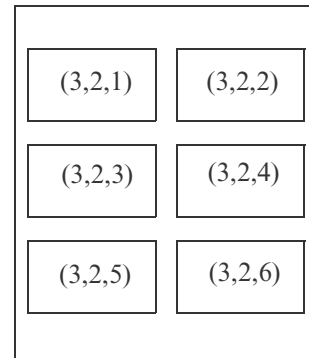
5.11 MULTIPLE FIGURE WINDOWS

When plot or any other command that generates a plot is executed, the Figure Window opens (if not already open) and displays the plot. MATLAB labels the Figure Window as Figure 1 (see the top left corner of the Figure Window that is displayed in Figure 5-4). If the Figure Window is already open when the plot or any other command that generates a plot is executed, a new plot is displayed in the Figure Window (replacing the existing plot). Commands that format

plots are applied to the plot in the Figure Window that is open.

It is possible, however, to open additional Figure Windows and have several of them open (with plots) at the same time. This is done by typing the command `figure`. Every time the command `figure` is entered, MATLAB opens a new Figure Window. If a command that creates a plot is entered after a `figure` command, MATLAB generates and displays the new plot in the last Figure Window that was opened, which is called the active or current window. MAT-LAB labels the new Figure Windows successively; i.e., Figure 2, Figure 3, and so on. For example, after the following three commands are entered, the two Figure Windows that are shown in Figure 5-12 are displayed.

```
>> fplot(@ (x) x.*cos(x),[0,10])     Plot displayed in Figure 1 window.
>> figure                                    Figure 2 window opens.
>> fplot(@ (x) exp(-0.2*x).*cos(x),[0,10])   Plot displayed in Figure 2 window.
```
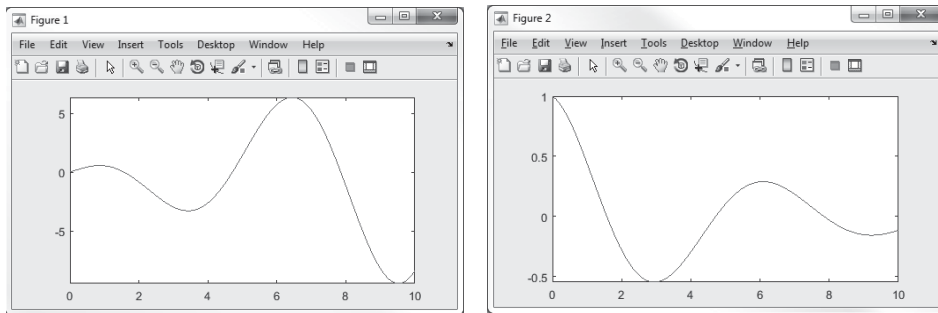

Figure 5-12: Two open Figure Windows.

The `figure` command can also have an input argument that is a number (integer), of the form `figure(n)`. The number corresponds to the number of the corresponding Figure Window. When the command is executed, window number n becomes the active Figure Window (if a Figure Window with this number does not exist, a new window with this number opens). When commands that create new plots are executed, the plots that they generate are displayed in the active Figure Window. In the same way, commands that format plots are applied to the plot in the active window. The `figure(n)` command provides means for having a program in a script file that opens and makes plots in a few defined Figure Windows. (If several `figure` commands are used in a program instead, new Figure Windows will open every time the script file is executed.)

Figure Windows can be closed with the `close` command. Several forms of the command are:

`close` closes the active Figure Window.

`close(n)` closes the *n*th Figure Window.

`close all` closes all Figure Windows that are open.