Overview

Most of Igor programming consists of writing user-defined functions.

A function has zero or more parameters. You can use local variables to store intermediate results. The function body consists of Igor operations, assignment statements, flow control statements, and calls to other functions.

A function can return a numeric, string, wave reference or data folder reference result. It can also have a side-effect, such as creating a wave or creating a graph.

Before we dive into the technical details, here is an informal look at some simple examples.

```
Function Hypotenuse(side1, side2)
   Variable side1, side2

   Variable hyp
   hyp = sqrt(side1^2 + side2^2)

   return hyp
End
```

The Hypotenuse function takes two numeric parameters and returns a numeric result. "hyp" is a local variable and sqrt is a built-in function. You could test Hypotenuse by pasting it into the built-in Procedure window and executing the following statement in the command line:

```
Print Hypotenuse(3, 4)
```

Now let's look at a function that deals with text strings.

```
Function/S FirstStr(str1, str2)
   String str1, str2

   String result

   if (CmpStr(str1,str2) < 0)
      result = str1
   else
      result = str2
   endif

   return result
End
```

The FirstStr function takes two string parameters and returns the string that is first in alphabetical order. CmpStr is a built-in function. You could test FirstStr by executing pasting it into the built-in Procedure window the following statement in the command line:

```
Print FirstStr("ABC", "BCD")
```

Now a function that deals with waves.

```
Function CreateRatioOfWaves(w1, w2, nameOfOutputWave)
   WAVE w1, w2
   String nameOfOutputWave

   Duplicate/O w1, $nameOfOutputWave
   WAVE wOut = $nameOfOutputWave
   wOut = w1 / w2
End
```

The CreateRatioOfWaves function takes two wave parameters and a string parameter. The string is the name to use for a new wave, created by duplicating one of the input waves. The "`WAVE wOut`" statement creates a wave reference for use in the following assignment statement. This function has no direct result (no return statement) but has the side-effect of creating a new wave.