**An Improved Simultaneous Equations Solver**

A more complex problem is a three dimensional system of linear Simultaneous Equations using Solver. To do this, construct a worksheet to solve any system of three-dimensional linear equations with three unknowns x, y and z. Let the system have the general form:

a1x+b1y+c1z – d1= 0

a2x+b2y+c2z –d2= 0

a3x+b3y+c3z –d3= 0

We shall use three named cells for the variables x, y and z*,* and 12 named cells for the coefficients. Our worksheet will show cells with text such as (a1, b1, c1 and d1) etc., will use the names (a1, b1, c1 and d1) etc. We cannot use "cl", etc., as names so we will use "c \_1", etc., both as text and as names of cells.

As a concrete example: upon which to design the worksheet, we will solve the system of equations in Equation 10.3.

2x + 4y + 5z - 33 = 0

6x + 6y + 7z - 70 = 0

3x - 6y + 4z + 71 = 0

1. On Sheet8 of CHAPI0.XLS construct a worksheet as shown in Figure 10.18,
temporarily ignoring K4:K7.
2. Now we must create names. This will require using !nsertjNamejCreate five
times; once for A4:B6, then with C4:D6, etc.

**Figure 10.18**

c) Enter the formulas for the three equations in the set:

 K4: =a1\_\*x + b1\_\*y + c\_1\*z + d1\_

 K5: =a2\_\*x + b2\_\*y + c\_2\*z + d2\_

 K6: =a3\_\*x + b3\_\*y + c\_3\*z + d3\_

1. As before, we need a single cell as the target for Solver. Rather than computing
the sum of the absolute values of the three functions, we will sum their squares.
In K7 type the formula SUMSQ(K4:K6) to achieve this.

e) We are ready to use Solver. The *Target* cell should be K7 - the cell that sums the squares of the functions. Make sure to use *Equal to Value* of 0, and set the *By Changing Cells* to B4:B6. Now click the Solve button. The results are *x* = 6.0, *y* = 11.5 and *z* = -5.0. Actually, these are the values rounded to one decimal place!

f) Save the workbook.