Using Excel to Solve Systems of Equations

In assignment 2 we need to solve the following system of equations to obtain the correction vector:

$$[B] \bullet C = R$$

where [B] is a 5x5 matrix, R is five member resultant vector (both [B] and R are known at the start of each iteration), and C is the vector that contains the unknown correction variables. This can be solved by first inverting [B] to get $[B]^{-1}$, and then multiplying $[B]^{-1}$ times R to get C:

$$[B]^{-1} \bullet R = C$$

This can be done in Excel as follows:

1. Generate your 5x5 B matrix in a 5x5 area of cells.
2. Name the matrix. This is done by highlighting the 5x5 area, then going to "Insert", and then "Name" and then "Define". A box will open that allows you to name the matrix, which you could call "Beta" or something.
3. Calculate the inverse matrix. Highlight a 5x5 empty area on your spreadsheet. With the highlight active, enter "=minverse(beta)" in the formula bar (don't include the " symbols). Then hit <control-shift-enter> simultaneously. This signals to Excel that this is a matrix operation. The inverse of Beta should appear in the 5x5 space.
4. Name the new inverse matrix just as you did in step 2 (i.e., highlight and then go through the "Insert", and then "Name" and then "Define" steps to get the dialog box. Call it Betainv or something.
5. Generate your R vector, and put it as a vertical column next to your inverse matrix.
6. Name R as a matrix as noted above.
7. Multiply the inverse matrix and R to get C. Highlight a five entry column in a blank part of the sheet. Enter in the formula bar the following: "=mmult(betainv,R)". Press <control-shift-enter> simultaneously and the correction vector will appear.
8. You can verify the process by multiplying the C you calculate times beta to see if you get R back.

Note that subsequent changes in the values of Beta or R will automatically propagate through to C.