Homework 3: Unconstrained optimization involving multiple variables
DUE DATE: 10/2/18

This homework uses the following objective function and the starting location $\vec{x}^0 = \begin{Bmatrix} 3 \\ 4 \\ 1 \end{Bmatrix}$.

$$F = x_1^2 + 2x_2^2 + 2x_3^2 + 2x_1x_2 + 2x_2x_3$$

For each update of the current design point, please report:
- The current design point, $\vec{x}$
- The search direction, $\vec{S}$, being used for your move
- A plot of F as a function of alpha associated with the 1-D search for this move
- The value of α^* for this move
- The updated design point (from the update relationship)

In solving these problems, you can either create a code in Matlab for each algorithm, or you can use the Excel solver to find α^*, as shown in class.

1. Complete **two cycles** of the Powell's Method of Conjugate Directions.

2. Update the design point **three times** using the Steepest Descent method.

3. Update the design point **three times** using Fletcher-Reeves Conjugate Gradient Method.

4. Update the design point **three times** using BFGS. For this problem please report the value of $\vec{D}, \vec{E},$ and $\vec{H}$ for each iteration.