1.
a) The height of the resulting array is 41, 2.
c) I picked these numbers off of a friend's recommendation that c_1 and c_2 are proportional to height, v_{01} and v_{02} indicate the horizontal position of the peak, and g_1 and g_2 represent the width.
f) It returns a tuple with the first element of the tuple being the optimum parameters to minimize the residual.
g) x_1 is a numpy.array (float64) of size 6. Residuals is very close to zero.
h) They match insanely well! This is blowing my mind. The best fit curve goes approximately through the data points. Best-fit peak wavenumbers, are $v_{01} = 2.026 \times 10^4$ and $v_{02} = 2.0558 \times 10^4$.

2.
d) I find very little resulting error, especially with the smaller matrices. For example, for the 3x3 random matrix, I get basically 0 error. As they increase, however, the error increases. I assume this is caused by compounding error.