Here we have 2 graphs. The first details a scatterplot that has the determinant as the x axis and trace as the y axis. The scatter plot points were created in Intellij through a series of matrix creation. First, 300 2x2 matrices are created through a randomization process. Next, many empty arrays are created to hold the trace, the determinant, and the iterations for the A and A-1 matrices as well. 2 constant variables, tolerance and max iterations are created. They hold the values .000005 and 100 respectively.

All of these values are passed into the power method. This method returns the values that will fill the arrays from before. Next the values are passed into the same method with the matrix a-1 instead. Then, all these values are stored into the arrays before being printed to a text file.

The values passed to the text/csv file were then passed into Microsoft Excel to create these stunning graphs. The colors are determined by how many iterations it took to converge.

This graph shows the relationship between Determinant and trace. The colors are split between 3 categories. 1 iteration, the best, 2-10 iterations, good amount of iterations, and 15-100, a big range for a small amount of values.

This graph also shows the relationship between Determinant and trace. The colors are split between 3 categories. 1 iteration, the best, 2-10 iterations, good amount of iterations, and 12-100, a big range for a small amount of values.

These two graphs have all the same data points. If you look at certain values (the outliers) they are the ones that differ from graph to graph. These graphs have a strong correlation towards the center and then have a point towards the negative determinant. The trace of the graph (when the determinant is negative) does not vary much. The max variations at the point (-6 Determinant). This is because the trace of a matrix is (a11 + a22) and the positivity of a determinant of a matrix directly dependent on those same two points. If the trace is negative, the determinant has to be small (and accordingly close to 0) because the variation of b and c are small in that case as well. This applies to the positive determinant as well. When the determinant is positive, that means that a \* d is larger than b \* c. This gives us a large range for trace since a \* d is positive. These properties give these two graphs the arrowhead shape.