Part 2 Written Component:

The scatter-plot points form two distinct shapes: the graph of the general function: , and a triangle between the approximate values (-1,0), (.8,-2), and (.6, .7). The two plots are related in that when it takes more iterations of the power method of A to converge, it takes less for to converge. More specifically, the points on the “the graph of the general function: , all take between 70-100 iterations to converge, with the majority being in the 90-100 range. On the inverse graph, however, the number of iterations for those points lies in the 1-10 range, showing a quick rate of convergence. Note that, as the trace is equivalent to the sum of the values on the main diagonal, and the values on the main diagonal (represented as ‘a’ and ‘d’) of the inverse matrix are equivalent to (d/determinant(A), a/determinant(A)), the sum of the trace of equals (trace(A)/determinant(A)). If the determinant is large, then the trace of will be small in magnitude, and thus the eigenvalues will be small in magnitude.

In the triangle for the graph of A, the number of iterations needed for convergence is smaller towards the edges, but gets increasingly larger as the point approaches (0,0). This makes sense, as the convergence ratio is based on the absolute value of λ2/λ1. As this method approaches 1, the rate of convergence decreases and the number of iterations increases.

These findings make sense as, if the number of iterations for A is large, then the ratio of λ2/λ1 approaches 1. As the eigenvalues of are 1/ λ1 and 1/ λ2, the convergence ratio of equals (1/ λ1)/( 1/ λ2). Thus, the convergence ratio of is inversely related to the convergence ratio of A.