**The Hilbert Matrix**

**Conditions:**

Find the solution and errors for the Hilbert matrix of the dimension for

**Solution:**

**Discussion:**

1. Not only are LU and QR faster in terms of big-O compared to Gaussian elimination (LU has a big-O of O((4/3) n^3), while Gaussian Elimination takes O((1/3) n^4)), but the code for LU and QR is less verbose, which allows for code that’s both easier to write and to understand, which is crucial to large programs with many moving parts.
2. LU and QR have less error in the final decomposition and when solving the system Ax= b, since LU and QR require fewer computations and rely on the properties of Matrices (such as Q^-1 = Q^t, since Q is orthogonal) to compute a solution, rather than working out all the math necessary to solve a system of equations.