CONVOLUTIONAL CODES

Using a tolerance of .000001, the zero vector as the initial vector, and the matrix given in the a.dat file on T-Square:

The Jacobi method required 36741 iterations while the Gauss-Seidel method required only 50 iterations.

Using a tolerance of .01:

The Jacobi method required 35 iterations while the Gauss-Seidel method required only 14 iterations.

The Gauss-Seidel method is appears to iterate through a much smaller amount of iterations. However, this difference is inversely proportional to the tolerance. As the tolerance increases, the difference between the numbers of iterations the Jacobi and Gauss-Seidel methods repeat through greatly decreases.

The reason why Gauss-Seidel method is more efficient because whereas Jacobi builds the current iteration's solution vector based on the previous iteration's solution vector, Gauss-Seidel dynamically builds the solution vector off of the values inside the current iteration's solution vector itself. It's more accurate because it builds upon the current iteration, instead of the previous iteration.

We see differences in the number of iterations of Jacobi and Gauss Seidel when using binary entries.

Using tolerance 10^-8 and random streams:

n (length of initial stream)	# of Jacobi iterations	# of Gauss Seidel iterations
5	6	6
6	7	7
7	9	9
10	11	11
17	17	17
27	28	28

When using matrices of binaries, the difference between the iterations for Jacobi and Gauss Seidel becomes virtually zero.

We can also see that the length of the initial stream, n, is important and is directly proportional to the number of iterations for Jacobi and Gauss-Seidel.