**Urban Population Dynamics**

**Discussion:**

1. The data in the first row of matrix A are the birthrates from the age demographic the rows represent (0-9, 10-19, etc.). The age groups that produce the most offspring are between the ages of 10 and 39. The range of ages that produce offspring in general is 10-49. This demographic contains those that are capable of producing offspring.

The survival rates of each age group are below the first row in their respected columns. Like most human populations in developed countries, those between the ages of 10 and 49 have the highest survival rate while those older than 70 and younger than 10 have a higher mortality rate. In cities with good medical assistance and health standards, survival rates tend to be higher than had the human population been devoid of these benefits.

1. See data in the “UrbanPopulationDynamics.txt” file.
2. Eigenvalue = 1.288656233542479. The maximum eigenvalue is the overall growth rate of the population. This equates to the formula , where is the initial total population and is the number of iterations (note that & > 0). Since the eigenvalue is greater than 1, the population will diverge as . Thus, in the long run, the population will become unstable.
3. See data in the “UrbanPopulationDynamics.txt” file. Since the largest eigenvalue is less than that in the example above but is still greater than 1, the population will be more stable than the above later on but will still become unstable eventually.