1. Implement the SAMC algorithm for a traveling salesman problem for which 100 cities are uniformly distributed on a square region of length 100 miles. Find the average length of the shortest tour.

2. Implement the simulated stochastic approximation annealing algorithm for the traveling salesman problem as described in Problem 1.

3. Implement the SAMC algorithm for estimating the mean and covariance matrix of the distribution

\[ f(x) = \frac{1}{3} N(\mu_1, \Sigma_1) + \frac{1}{3} N(\mu_2, \Sigma_2) + \frac{1}{3} N(\mu_3, \Sigma_3), \]

where \( \mu_1 = (-8, -8)^T \), \( \mu_2 = (6, 6)^T \), \( \mu_3 = (0, 0)^T \), and

\[
\Sigma_1 = \begin{pmatrix} 1 & 0.9 \\ 0.9 & 1 \end{pmatrix}, \quad \Sigma_2 = \begin{pmatrix} 1 & -0.9 \\ -0.9 & 1 \end{pmatrix}, \quad \Sigma_3 = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}.
\]

4. Implement SAMC for evaluating \( p \)-values of the two-sample \( t \)-test.

5. Implement the SAMC trajectory averaging estimator for the change-point problem described in Section 7.6.1 of Liang et al. (2010, book).