Monte Carlo Simulation

a. Statement: We want to identify the probability that any two random individuals have the same week day as their day of birth. Write a code using Monte Carlo simulation method to solve this problem.
b. Statement: A project manager approaches to you and says that there is a 90% chance to win a part or full project. There are about 50-100 tasks per modules and each module can vary between 5-10 days per module. About 10-12 modules if we get part of the project and 20-24 if we get the entire project. The resources vary between 3 to 7. What is the most likely time to complete the project?
c. A company wants to decide whether they should outsource product development or they should do it in-house. The operations team estimated that per component they want to produce in-house has:

   Maintenance will be between $10-20.

   Labour will cost between $2 to 8.

   Raw material will cost between $3 to 9.

   They believe they can make 15,000 to 35,000 components in a year.

   They found a vendor who agreed to supply to them a component for $20.

   What should they do?

Genetic Algorithm

Statement: You are going to spend a month in the wilderness. You're taking a backpack with you, however, the maximum weight. It can carry is 20 kilograms. You have a number of survival items available, each with its own number of "survival points". Your objective is to maximize the number of survival points while selecting the items. Use genetic algorithm to solve this.

Data:

Items -- Pocketknife, beans, potatoes, unions, sleeping bag, rope, compass

Survival points are 10, 20, 15, 2, 30, 10 & 30 in the respective order

Weight are 1, 5, 10, 1, 7, 5 & 1 in the respective order