

Activity Sheet

1. As discussed in the previous session, let's create random samples for the following problem.
 - a. A die with 4 sides and for each of the sides, the probabilities are for 1= 0.3, for 2=0.4, for 3=0.1 and for 4=0.2. Create samples with 10, 100 and 1000 elements and list the samples.

2. Genetic Algorithm

- a. 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 80 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:

```
dataset <- data.frame(item = c("pocketknife", "beans", "potatoes", "onions", "phone",  
"lemons", "sleeping bag", "rope", "compass", "umbrella", "sweater", "medicines", "others"),  
survivalpoints = c(15, 16, 13, 14, 20, 12, 17, 18, 17, 19, 10, 12, 11),  
weight = c(5, 6, 3, 4, 11, 2, 7, 8, 10, 9, 1, 12, 11))
```

Assignment: Write the steps to solve using GA for the following problem and also pseudo code.

You have 100 cities and need to cover all the cities minimizing the distance travelled. A distance between the cities matrix is given.

3. 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. Assignment: 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 task. 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?