2019 Spring –SPCO HW#1

1. Super Lotto 638 (威力彩) is one of the lotteries in Taiwan (http://www.taiwanlottery.com.tw/Superlotto638/index.asp). There are two sets of winning numbers. For the first set, there are six winning numbers are randomly picked from thirty-eight balls numbered 1 to 38. For the second set, one winning number is selected from 1 to 8 randomly.

   (a) According to the official website of Taiwan Lottery (http://www.taiwanlottery.com.tw/faq/faq_faq02_detail10.asp#), the probability to win a prize is 1/9. Explain how the probability is calculated and why? What are the assumptions behind the calculations of the probabilities?

   (b) Let Event A be the event that the second-set winning number is an odd number; Event B be the event that there are 4 or more odd first-set winning number and Event C be the event that there is at least one winning number that is less or equal to 5 from both sets of numbers. Are these events mutually exclusive or independent?

   (c) Given that you have chosen the right second-set number, what will be the condition probability for you to win a prize?

2. Find the winning six first-set numbers and the wining second-set number of the latest 50 runs from the internet and calculate the number of appearances for each of the 38 first-set numbers and the number of appearances for each of the 8 second-set numbers. Rank the numbers with their appearance frequencies (the number of appearances divided by the number of runs) and plot bar-charts to observe the differences among the 38 first-set numbers and the 8 second-set numbers. Calculate the average, medium (find the formula from internet or any text book), maximum, minimum, range (maximum-minimum), and sample variance (find the formula from internet or any text book) of appearance frequencies of the 38 first-set numbers and the 8 second-set numbers. Do the same for winning numbers for the latest 100 runs and for the latest 500 runs. Describe and discuss what you observe from the analysis and come up with a strategy of choosing the numbers in the future.