**Assignment**

**What to submit?**

Please submit (i) a word file explaining in detail your answers to each question (you can use screenshots of the R to explain your answers) AND (ii) an R file with a separate tab for each question. For each question, make sure you develop the model and present the simulation results – the R file should be self-explanatory. **The assessment of your work will include both the accuracy and the clarity of your word file and the R file.**

1. A convenience store needs to make a decision of how many packages of California rolls prepare for tomorrow. A package of California rolls cost the store $2.00 and it sells for $6.00. Daily demand is normally distributed with a mean of 100 packages of California rolls and a standard deviation of 40 packages of California rolls. If there are leftovers at the end of the day, the store donates them.
   1. Use simulation optimization to find the optimal packages of California rolls that maximizes the store’s profit.
   2. Add a chance constraint to the model (VaR constraint) to make sure that there is a 90% chance that California rolls are available to the customers. Then, use optimization to find the optimal packages of California rolls that maximizes the store’s profit.
2. Marcy Hotel is a boutique hotel in Boston downtown area. The operations manager, Jenna, needs your help to decide how many rooms (of a particular type) to book for a day. The nightly stay in these rooms is $200 and the hotel has 100 of those rooms. The data shows that some customers do not show-up. To protect against no show-ups, Jenna is considering to book more than 100 rooms per night. Although this practice allows Jenna to utilize each room available as much as possible, it comes with a risk. The risk is that if Jenna books more than 100 rooms and if more customers than expected show-up, then some customers will not be able to stay at the hotel even though they made a reservation. To protect those customers, Marcy Hotel is providing a compensation of 120% of the booking price paid by the customer. Also, any no show-up customer Is refunded 30% of the booking price paid by the customer. How many rooms should Jane book in a day to maximize its expected revenue. Answer this question by developing a simulation optimization model. In your model, assume that the number of no-shows is lognormally distributed with a mean of (0.2\*number of rooms booked) and standard deviation of (0.05\*number of rooms booked).