

Homework #4

You should work individually on this assignment, but you may discuss and debate your answers with your colleagues.

- Use 10,000 trials for the simulation run length in each problem below.
Base case scenario is NOT required!

1. A car rental company has 120 midsize cars that rent for \$95 per day, and its operational cost is \$35. All rentals are by reservation and there is a 10% chance that an individual reservation will not show up. Customers who make a reservation but don't show up still pay the rental fee. If a customer arrives at the rental company with a reservation and no midsize car is available due to overbooking, the rental company will refund the cost of the car and pay \$140 to put the customer up at car rental (or promote to a full-size car). The car rental's current policy is to stop accepting reservations when it reaches an overbooking limit of 135 reservations. (55 points)
 - a. Develop a simulation model to evaluate the car rental's total profit when it receives the maximum number of reservations under the current policy. (Modeling and part a 20 points)
 - b. What is your estimate of the mean total profit? (3 points)
 - c. What is the 90% confidence interval for your estimate of the mean total profit? (7 points)
 - d. What is your estimate for the probability of making a profit of at least \$8,700 on one day? (3 points)
 - e. What is the 95% confidence interval for your estimate of this probability? (7 points)
 - f. What overbooking level maximizes the mean total profit? (10 points) (other coding issues 5 points)
2. A small nonprofit organization is planning a door-to-door marketing campaign to sell Christmas wrapping. They plan to visit a neighborhood with 35 homes. Consultants have estimated that they should expect to find someone home 70% of the time. When someone is home there is a 33% probability they make a purchase, and when they do so the dollar value of their purchase is normally distributed with a mean of \$27 and a standard deviation of \$6. (45 points)
 - a. What is the total amount of revenue the nonprofit organization can expect to generate from this neighborhood? (4 points)
 - b. Compute the 95% confidence interval for the mean of the total revenue? (7 points)
 - c. What is the probability that the nonprofit will collect more than \$300? (4 points)
 - d. Compute the 90% confidence interval for the probability/proportion estimate in part (c). (7 points) (Correct modeling 18 points, other coding issues 5 points)