Homework #4

This is an individual assignment. All work submitted must be your own.

1. A small nonprofit organization is planning a door-to-door marketing campaign to sell gift wrapping paper in a neighborhood containing 100 homes. Based on past experience, they expect to find someone home 80% of the time. When someone is home there is a 30% probability they make a purchase, and if they make a purchase the dollar value of the purchase is normally distributed with a mean of $25 and a standard deviation of $5. Use 1,000 trials in your analysis.
    a. What is the total amount of revenue the nonprofit organization can expect to generate from these 100 homes?
    b. Compute the 95% confidence interval for the mean total revenue?
    c. What is the probability the nonprofit will collect more than $800?
    d. Compute the 90% confidence interval for the probability estimate in part (c).

2. A small hotel has 50 rooms that rent for $105 per night, and it costs $45 to clean a room after it is used. 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 hotel with a reservation and no room is available due to overbooking, the hotel will refund the cost of the room and pay $150 to put the customer up at another hotel. The hotel's current policy is to stop accepting reservations when it reaches an overbooking limit of 56 reservations. Use 10,000 trials in your analysis.
    a. Develop a simulation model to evaluate the hotel's total profit when it receives the maximum number of reservations under the current policy.
    b. What is your estimate of the mean total profit?
    c. What is the 90% confidence interval for your estimate of the mean total profit?
    d. What is your estimate for the probability of making a profit of at least $3,800 on a single night?
    e. What is the 95% confidence interval for your estimate of this probability?
    f. What overbooking level maximizes the mean total profit?