Delivery Times at Snow Pea Restaurant

The SnowPea Restaurant is a Chinese carryout/ delivery restaurant. Most of SnowPea’s deliveries are within a 10-mile radius, but it occasionally delivers to customers more than 10 miles away. SnowPea employs a number of delivery people, four of whom are relatively new hires. The restaurant has recently been receiving customer complaints about excessively long delivery times. Therefore, SnowPea has collected data on a random sample of deliveries by its four new delivery people during the peak dinner time. The data are in the file C08\_03.xlsx. The variables are as follows:

■ Deliverer: which person made the delivery

■ Prep Time: time from when order was placed until delivery person started driving it to the customer

■ Travel Time: time to drive from SnowPea to customer

■ Distance: distance (miles) from SnowPea to customer

Solve the following problems and then, based on your analysis, write a report that makes reasonable recommendations to SnowPea management.

SnowPea is concerned that one or more of the new delivery people might be slower than others.

a. Let μDi and μTi be the mean delivery time and mean total time for delivery person i, where the total time is the sum of the delivery and prep times. Find 95% confidence intervals for each of these means for each delivery person. Although these might be interesting, give two reasons why they are not really fair measures for com- paring the efficiency of the delivery people.

Responding to the criticisms in part a, find a 95% confidence interval for the mean speed of delivery for each delivery person, where speed is measured as miles per hour during the trip from SnowPea to the customer.Then find 95% confidence intervals for the mean difference in speed between each pair of delivery people.

2) SnowPea would like to advertise that it can achieve a total delivery time of no more than M minutes for all customers within a 10-mile radius. On all orders that take more than M minutes, SnowPea will give the customers a $10 certificate on their next purchase.

a. Assuming for now that the delivery people are representative of all of SnowPea’s delivery people, find a 95% confidence interval for the proportion of deliveries (within the 10-mile limit) that will be on time if M = 25 minutes; if M = 30 minutes; if M = 35 minutes.

b. Suppose SnowPea makes 1000 deliveries within the 10-mile limit. For each of the values of M in part a, find a 95% confidence interval for the total dollar amount of certifi- cates it will have to pay for being late.

3.The policy in the previous problem is simple to state and simple to administer. However, it is somewhat unfair to customers who live close to SnowPea—they will never get $10 certifi- cates. A fairer, but more complex, policy is the following. SnowPea first analyzes the data and finds that total delivery times can be predicted fairly well with the equation

Predicted Delivery Time = 14.8 + 2.06\*Distance

(This is based on regression analysis, the topic of Chapters 10 and 11.) Also, most of these predic- tions are within 5 minutes of the actual delivery times.Therefore, whenever SnowPea receives an order over the phone, it looks up the customer’s address in its computerized geographical data- base to find distance, calculates the predicted delivery time based on this equation, rounds

this to the nearest minute, adds 5 minutes, and guarantees this delivery time or else a $10 cer- tificate. It does this for all customers, even those beyond the 10-mile limit.

a. Assuming again that the delivery people in the sample are representative of all of SnowPea’s delivery people, find a 95% confidence interval for the proportion of all deliveries that will be within the guaranteed total delivery time.

b. Suppose SnowPea makes 1000 deliveries. Find a 95% confidence interval for the total dollar amount of certificates it will have to pay for being late.