STA 304H1F-1003H Fall 2019
Assignment 2-Question 3

Question 3. (18 marks)

A certain manufacturing firm produces a product that is packaged under two brand names, for marketing purposes. These two brands serve as strata for estimating potential sales volume for the next quarter. A SRS of customers for each brand is contacted and asked to provide a potential sale figure y (in number of units) for the coming quarter. Last year's true sales figure, for the same quarter, is available for each of the sampled customers and is denoted by x. The data are given in the accompanying table. The sample for brand I was taken from a list of 120 customers for whom the total sales in the same quater of last year was 24,500 units. The brand II sample come from 180 customers with a total quarterly sales last year of 21 200 units.

Brand I	
x_i	y_i
204	210
143	160
82	75
256	280
275	300
198	190

Brand II	
x_i	y_i
137	150
189	200
119	125
63	60
103	110
107	100
159	180
63	75
87	90

Use R to do the following questions. Please, use the R-output to answer question. The R command should be reported in an eppendix. It worse 2 marks.

(Part 1) (10 marks) Using Separate Ratio Estimator Method (SR)

(a) (2 marks) Find a basic estimate (without auxiliary information) of the total potential sales. Estimate the variance of your estimator.

(b) (2 marks) Find a ratio estimate of the total potential sales. Estimate the variance of your estimator.

(c) (2 marks) Find a regression estimate of the total potential sales. Estimate the variance of your estimator.

(d) (3 marks) Compute the relative efficiency of

(i) ratio estimation to basic estimation

(ii) ratio estimation to regression estimation

(iii) regression estimation to basic estimation

(e) (1 mark) Which method of estimation do you recommend?

(Part 2) (6 marks) Using Combined Ratio Estimator Method (CR)

(a) (2 marks) Find a basic estimate (without auxiliary information) of the mean potential sales. Estimate the variance of your estimator.

(b) (2 marks) Find a ratio estimate of the mean potential sales. Estimate the variance of your estimator.

(d) (1 mark) Compute the relative efficiency of ratio estimation to basic estimation

(e) (1 mark) Which method of estimation do you recommend?