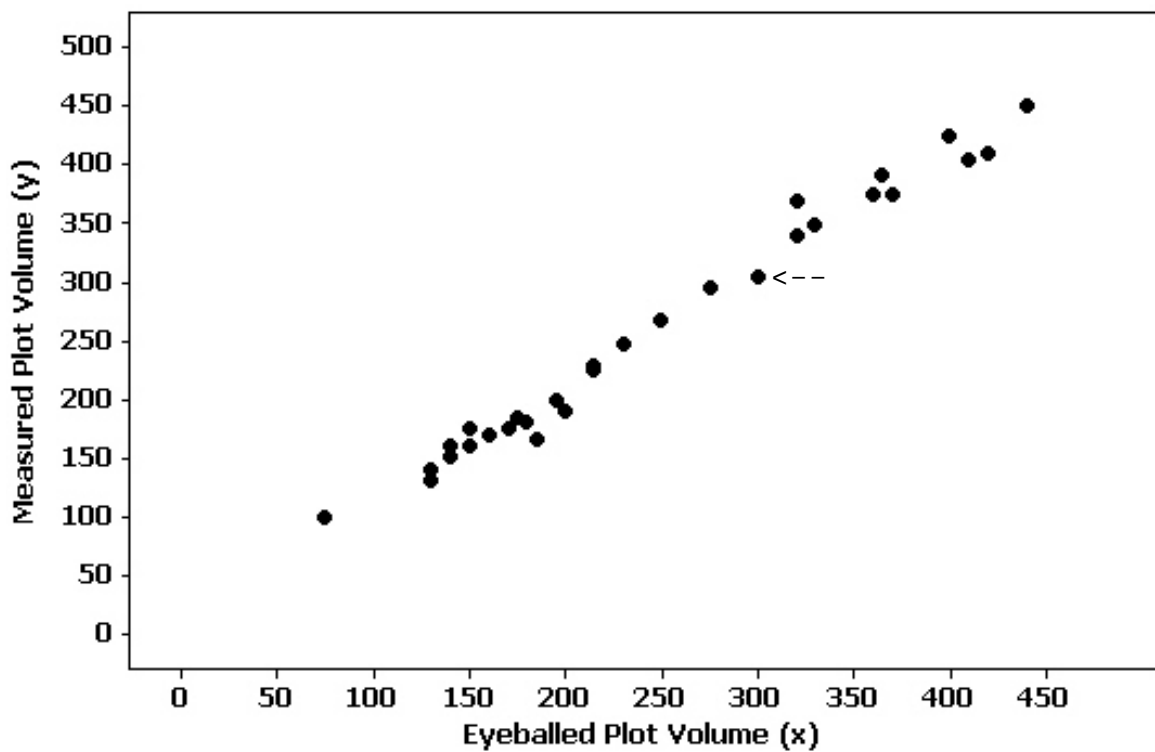


A district forester wants to obtain an estimate of the total merchantable volume in a 45-acre timber stand. The forester has in her employ a very experienced timber cruiser who has the ability to obtain very good estimates of standing volume by simply walking through the stand and provide an “eyeball” estimate. The district forester is fairly confident in the experienced cruiser’s estimates but wants to have a more objective estimate than the eyeball estimate of stand volume. She decides to carry out the following study. A simple random sample of thirty 1/10-acre plots are selected. For each of these plots, the cruiser will provide an eyeball estimate of volume in board feet ( $x$ ) and then take appropriate tree measurements to calculate the desired volume in board feet ( $y$ ). The following data were obtained:

Eyeballed plot volume in board feet ( $x$ )	Measured plot volume in board feet ( $y$ )	Eyeballed plot volume in board feet ( $x$ )	Measured plot volume in board feet ( $y$ )
320	340	130	140
360	375	215	225
410	405	230	248
195	200	75	100
180	180	150	175
215	228	140	160
365	392	130	130
370	375	140	152
330	348	160	169
320	369	170	175
440	450	200	190
400	425	175	185
420	410	185	165
300	305	275	295
150	160	250	268

1. (2pt) In terms of this forestry application, what do the ratio  $B$  and the total  $t_y$  represent?
2. (.5pt) What is the estimate of  $B$ ?
3. (.5pt) What is ratio estimate of  $t_y$ ?
4. (1.5pt) What is  $\widehat{V}(\widehat{t}_{yr})$ ?
5. (1.5pt) Provide an approximate 95% confidence interval for  $B$ .

6. (2pt) Provide a practical interpretation of this confidence interval for the district forester.
7. (1pt) Provide an approximate 95% confidence interval for  $t_y$ .
8. (1pt) Provide an interpretation of this confidence interval in the context of this problem.
9. (1pt) Based on the scatterplot of the data, would you expect ratio estimation to be an improvement over estimation based on the SRS of  $y$ -values only? Why?



10. (1pt) Suppose the point to the left of the arrow is removed. What is the new estimate of  $t_y$ ?
11. (2pt) For Stat grad students: Exercise 20 (a), page 159.