

FO-2213 Forest Measurements
Problem Set 3: Forest Inventory Computations

area_cruise_data.xls

I. Assume this is the tally data from a segmented strip cruise where each segment was 1 chain wide and 2 chains long with pulpwood tallied on the right half of the strip segment and sawtimber on the entire strip width. Tract acreage was 40 acres.

1. Total tree height was sub-sampled during the cruise and the resulting height equation was: $\ln(\text{Hgt}) = 4.543 - 3.31 (\text{dbh}^{-1})$

2. The standing tree volume function to be used is: $\text{CV}_3 = 3.6058 + 0.0026(\text{D}^2\text{H}_0)$

3. For the segmented strip cruise, compute by product class and total:

- a. trees and volume per acre by segment.
- b. overall trees and volume per acre for the cruise.
- c. precision statistics for the cruise to include:
 - variance
 - standard deviation
 - standard error of the mean volume
 - 95% sampling error
 - coefficient of variation

d. prepare and present a properly labeled table that gives the mean volumes (by product class and total) and their precision statistics for the inventory results.

4. Compute and present a properly labeled, per acre and total tract stand and stock table that gives the number of trees and volume on per acre and total tract basic for pulpwood, sawtimber, and total.

II. Assume the area_cruise_data from Part I above was from a fixed-radius plot cruise where the total circular plot was 0.1 acres and pulpwood was tallied on the right half of the circular plot and sawtimber on the entire plot. Total tract was 40 acres.

A. Using the same height and volume function from Part I above, repeat Steps 1- 4 as above for the fixed-radius plot cruise.

point_cruise_data.xls

III. Assume the point_cruise_data are from a BAF 10 prism cruise where 5 volume points (point numbers 1 - 5 only) were taken on a 40 acre tract.

1. Total tree height was sub-sampled during the cruise and the resulting height equations was: $\ln(\text{Hgt}) = 4.57 - 3.6114 (\text{dbh}^{-1})$

2. The standing tree volume function to be used is: $\text{Doyle}_6 \text{ bd. ft} = -57.66 + 0.01241(D^2H_0)$

3. For the prism cruise, compute by product class and total:

a. trees and volume per acre by point.

b. overall trees and volume per acre for the cruise.

c. precision statistics for the cruise to include:

variance

standard deviation

standard error of the mean volume

95% sampling error

coefficient of variation

d. prepare and present a properly labeled table that gives the mean volume and its associated precision statistics for the inventory results.

4. Compute and present a properly labeled, per acre and total tract stand and stock table that gives the number of trees, basal area, and volume on per acre and total tract basis for sawtimber.

IV. Assume the point_cruise_data are from a double-point BAF10 prism cruise where points 1-5 are volume points and points 6-15 were count-only (i.e. basal area) points taken on a 40 acre tract.

A. Use the same height and volume function from Part III above.

B. Compute the mean basal area and volume per acre on each of the 5 volume points and use these data to compute the linear regression equation for volume per acre as a function of basal area per acre: $\text{Vol} = b_0 + b_1 (\text{BA})$

C. Compute the mean basal area (ba_2) and volume per acre (\bar{y}_2) for the 5 volume points.

D. Use all 15 prism point to compute overall basal area per acre (BA_1) for count points.

E. Compute the linear regression, adjusted estimate of mean volume per acre with:

$$\bar{Y}_{lr} = \bar{y}_2 + b_1 [BA_1 - ba_2]$$

area_cruise_data.xls

Plot#	Prod	dbh	height	no.
1	Pulp	6		2
		8		1
		10		1
	Sawt	12		2
		14		5
		16		2
2	Pulp	6		3
		8		1
		12		4
	Sawt	14		4
		18		2
3	Pulp	6		1
		8		2
		10		3
	Sawtr	12		3
		14		6
		16		4
4	Pulp	6		2
		10		1
		14		1
	Sawt	16		3
		18		1
5	Pulp	8		2
		10		1
		12		1
	Sawt	14		1
		16		1

point_cruise_data.xls

Point#	DBH	Trees
1	10	2
1	11	1
1	13	3
1	15	3
2	11	3
2	9	2
2	12	2
3	12	3
3	15	3
3	16	4
4	12	2
4	13	3
4	14	4
4	16	2
5	12	3
5	13	3
5	14	3
5	16	3
6		8
7		9
8		7
9		9
10		8
11		10
12		10
13		9
14		10
15		11