

Additional Questions
Forest Measurements
Sixth Edition

CHAPTER 1: INTRODUCTION

1. Convert the following measurements from English to metric units:
 - a. 347 ft to km
 - b. 640 acres to ha
 - c. 23 square miles to km^2
 - d. 340 cubic feet to m^3
2. Convert the following measurements from metric to English units:
 - a. 6.4 km to ft
 - b. 68 ha to acres
 - c. 55 m^3 to cubic feet
 - d. 563 m^3 per ha to cubic feet per acre
3. An observation is recorded as 7.600 inches, which implies a measurement that is precise to the nearest _____ inch.
4. Define the following abbreviations:
 - a. DBH
 - b. BA
 - c. MBF
 - d. GPS

CHAPTER 2: STATISTICAL METHODS

1. For the sample data presented below, compute the following:
 - a. Mean
 - b. Median
 - c. Range
 - d. Variance
 - e. Standard deviation

34.7	39.5	40.0	29.4
37.8	53.4	35.6	43.7
46.1	23.5	45.6	44.2

2. How many different ways can 10 students sit in four chairs if:
 - a. their seating arrangement does not matter?
 - b. their seating arrangement does matter?
3. Given Y and Z are independent and $X = 2Y + 3Z$. If the mean of $Y = 7$ and variance of $Y = 4$, and mean of $Z = 2$ and variance of $Z = 1$, what is the mean and variance of X?
4. How many different combinations can be formed of 3 fertilization levels, 6 planting densities, and 4 site-preparation methods?

CHAPTER 3: LAND MEASUREMENTS

1. Convert the following measurements:
 - a. 12.917 ft to ft and inches
 - b. 4 chains 73 links to feet and inches
 - c. 824 square chains to acres
2. Convert the following magnetic azimuths to true bearings utilizing a declination of 7° west:
 - a. 87°
 - b. 93°
 - c. 184°
 - d. 276°
3. A GPS satellite is orbiting 15,000 miles above the center of the Earth. If the satellite circles the Earth in 12 hrs, how fast must it be traveling (mph)?
4. True or False: Differential correction of GPS measurements will not improve precision when selective availability (SA) is turned on.

CHAPTER 4: CUBIC VOLUME, CORD MEASURE, AND WEIGHT SCALING

1. Assume a log with little taper has a diameter of 24 in. and a length of 16 ft. What is the volume in cubic feet of a single square timber that can be made from this log?
2. Determine the volume (cu ft) contained in the following wood weights, given the specific gravity and moisture content of the wood, respectively.
 - a. 15,532 lb., 0.54, 100%
 - b. 2,698 lb., 0.38, 70%
 - c. 7,852 lb., 0.42, 120%

3. Basal area is defined as the cross-sectional area of a tree at breast height. Calculate the basal area (in sq ft) for trees having the following dbh measurements:
 - a. 5 in.
 - b. 8 in.
 - c. 12 in.
 - d. 20 in.
4. The total weight of a cord of pine is 5400 lbs; assuming a bark weight of 750 lbs, 75 ft³ of solid wood per cord, and 100% moisture content, what is the specific gravity?

CHAPTER 5: LOG RULES, SCALING PRACTICES, AND SPECIALTY WOOD PRODUCTS

1. What is the Veneer yield in square feet for a log with a small end diameter of 17 in. and length of 8 feet, assuming that the residual core will have a diameter of 6 in. and the veneer thickness is 1/8 in.?
2. Find the bd ft volume for the following 16-foot logs using the Scribner, Doyle, and International 1/4-in. log rules.
 - a. 7 in. top dib
 - b. 10 in. top dib
 - c. 20 in. top dib
 - d. 35 in. top dib
3. Which of the three most commonly used log rules takes log taper into account?
4. True or False: Log diameter, slabbing method, and saw thickness can affect bd ft/cu ft volume ratios?

CHAPTER 6: MEASURING STANDING TREES

1. Compute the mean basal area, arithmetic mean diameter, and quadratic mean diameter for the following diameters (in inches):

4.7	8.5	4.0	11.4
7.8	5.4	5.6	6.7
6.1	9.5	10.6	8.2

2. Compute the crown surface area (ft²) and crown volume (ft³) for the following trees (assume a cone is a reasonable approximation for the crown):
 - a. Crown width 15 ft, crown length 19 ft
 - b. Crown width 9 ft, crown length 25 ft
3. True or False: Quadratic mean diameter is usually less than arithmetic mean diameter.

4. Place the following tree diameters into one-inch and two-inch diameter classes:
 - a. 10.5
 - b. 6.1
 - c. 8.6
 - d. 9.0

CHAPTER 7: VOLUMES AND WEIGHTS OF STANDING TREES

1. Utilize equations in Table 7-11 to estimate the dry weight (kg) biomass for the following parts of an Engelmann Spruce tree with a 25 cm dbh:
 - a. Total aboveground biomass
 - b. Stem wood
 - c. Stem bark
 - d. Branch wood and bark
 - e. Foliage
2. Describe the difference between local and standard volume equations. Is one superior to the other?
3. Name one advantage and one disadvantage to using logarithms of dependent variables in regression analysis.
4. The estimated value of the intercept parameter (b_0) in the combined-variable volume equation $V = b_0 + b_1 D^2 H$ for merchantable volume should logically be positive, zero, or negative?

CHAPTER 8: SAMPLING DESIGNS

1. A forested tract was stratified into three forest cover types, with the following percent of total area in each class:
Class 1: 24 percent
Class 2: 34 percent
Class 3: 42 percent

Assuming a sample of 50 plots, how should these plots be allocated if using
 - a. stratified random sampling?
 - b. simple random sampling?

2. In regression estimation, one desires that the coefficient of determination (r^2) between x (independent variable) and y (dependent variable) is
 - a. Near zero
 - b. Near one
3. In a sample using 1/10-acre plots the variance of tree heights was determined to be 9.5. What would the estimated variance be if one were to measure heights in a sample of 1/5-acre plots?
4. Given a coefficient of variation (CV) of 40 percent, what would be the required sample size (infinite population) to estimate the mean volume per acre within ± 3 percent at the 90 percent confidence level?

CHAPTER 9: FOREST INVENTORY

1. In a timber trespass case, 5 lodgepole pines were cut that were on another landowner's property. The only available data is the stump diameter (outside bark) and approximate number of 16-ft logs for each erroneously cut tree. Estimate the dbh for these 5 trees (Section 9-12) and determine the total bd ft volume for which the landowner should seek compensation (Utilize Table 7-1, assuming International 1/4-in. rule, form class 80).

Stump dob	16-ft logs
40.6	4
29.7	3
32.4	3
18.7	2
24.2	2

2. Describe the difference between stand and stock tables.
3. True or False: Periodic checks of ocularly estimated tree heights are unnecessary for experienced timber cruisers.
4. Trees to be removed in a harvesting operation are usually marked with paint spots below _____.

CHAPTER 10: GEOSPATIAL INFORMATION

1. Define the difference between large- and small-scale photography, and give an example of each.
2. The scale of a photograph is given as 1:11,000. Will this be consistent for the entire photograph if:
 - a. the photo is taken in the coastal plain?
 - b. the photo is taken in the highlands?
3. List some important considerations for determining whether a given set of aerial photographs is adequate for a given project.
4. Which photo shows more land area—a photo with an RF of 1:50,000 or a photo with an RF of 1:5,000?
5. Describe the differences between absolute and relative locations.
6. Describe the differences between positional and classification errors.
7. Which data format, raster or vector, allows the most flexibility in delineating geographic features?
8. List the three most common types of error found in layers of GIS data.

CHAPTER 11: INVENTORIES WITH SAMPLE STRIPS OR PLOTS

1. Describe two methods for dealing with boundary overlap problems.
2. Determine the area sampled and total tract acreage from a 10% cruise utilizing parallel strips 1 chain wide, spaced at 10-chain intervals. A total of 207 lineal chains of sample strips were required.
3. Which regeneration survey method(s) require the use of permanent plots?
4. Compute the nominal cruise percent and expansion factor for $\frac{1}{4}$ -acre plots spaced 10 × 10 chains apart.

CHAPTER 12: INVENTORIES WITH POINT SAMPLES

1. Assume the following tree tally was obtained using a BAF 20 prism. Calculate the estimated basal area per acre and trees per acre from this sample point.

Diameter o.b., in.	Distance from point center, ft
10.4	20.1
15.7	27.3
8.1	12.0
4.9	11.2
36.2	68.4
25.8	57

2. True or False: In point sampling the prism must be held 25 in. from the user's eye.
3. True or False: In order to avoid bias when point sampling with a prism, it is critical that the cruiser's eye be directly over the sample point.
4. In a point sample with a BAF 10 prism, a borderline tree is encountered. Given that the tree diameter is 11.6 in. and the distance to the tree is 32.0 ft, should the tree be added to the tally?

CHAPTER 13: INVENTORIES WITH 3P SAMPLING

1. What are the three major components of 3P sampling?
2. How many trees (n_c) must be precisely measured to achieve an allowable error of 2 percent with a coefficient of variation of 17 percent and a 95 percent probability level?
3. A 3P cruise results in 67 trees being measured, of which 20 were from the sure-to-be-measured category. How many trees measurements should be used to estimate
 - a. total volume?
 - b. variance of total volume?
4. True or False: In 3P sampling, each tree has an equal probability of being selected for measurement.

CHAPTER 14: SITE, STOCKING, AND STAND DENSITY

1. The average age for a stand of trees is to be measured within ± 1 year, at a confidence probability of 95 percent (t value of 2). A preliminary sample of 7 age measurements has a standard deviation of ± 3 years. How many age measurements are required to achieve the given confidence level?
2. Define relative spacing and crown competition factor. How are these terms related?
3. A 10.6-in. dbh subject tree has three competitors:
(1) 9.3-in. dbh tree 18.3 ft away,
(2) 11.0-in. dbh tree 15.7 ft away, and
(3) 12.4-in. dbh tree 13.6 ft away.
Calculate the competition index (CI) for the subject tree using the distance-weighted size-ratio formula in Section 14-20.
4. Plotting the logarithm of mean tree volume vs. the logarithm of number of trees per unit area for self-thinning stands results in a linear relationship having a slope of approximately _____.

CHAPTER 15: TREE-GROWTH AND STAND-TABLE PROJECTION

1. What is the annual volume growth rate for a tree that was initially measured with a stump diameter of 11.2 in. and height to a 4-in. top of 49 ft., and remeasured 7 years later with a stump diameter of 13.4 in. and height to a 4-in. top of 77 ft.? Use Smalian's formula (Section 4-3) to compute the volume to the 4-in. top.
2. What type of stand structure is best suited for stand-table projection?
3. Assuming a simple annual growth rate of 4.5 percent, a tree presently containing 15.62 cu ft of volume should have how much volume after four more years of growth?
4. True or False: The most reliable measures of tree growth in a given stand are obtained from randomly established sample points at the beginning and end of the growth period.

CHAPTER 16: GROWTH AND YIELD MODELS

1. Describe the typical shape of diameter distributions observed in pure, even-aged stands and in regular, uneven-aged stands.
2. What are some attributes a forest manager should look for in choosing an appropriate growth and yield model?

3. Distance-dependent individual-tree growth models require that the _____ of each tree be known.
4. A loblolly pine tree is measured at age 15 as 7.5-in. dbh and 42.3 ft total height and at age 20 as 8.2-in. dbh and 55.2 ft total height. Compute (a) the 5-year periodic annual height and diameter increment, and (b) mean annual diameter increment.

CHAPTER 17: ASSESSING FOREST CARBON

1. For a typical tree species, convert an individual-tree stem green weight of 480 pounds to pounds of carbon.
2. Refer to Figure 17-3 and identify the two major Earth systems where atmospheric carbon is absorbed.