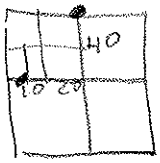
Name: Key

EXAM 1-09

FO-3015 Forest Description and Analysis

1. If you have paced 5.0 chains in 65 paces,

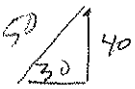
   a) Your average number of paces per chain is $\frac{65}{5} = 13$. (2)



   b) If you must pace between the NE corner of the NE 14/ of the NW 1/4 and the SE corner of the W 1/2, of the SW 1/4 of the NW 1/4, you will must travel:

   50 chains with (2)

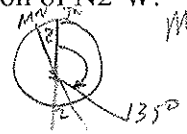
   50x13 = 650 paces (2)



2. Given a **true azimuth** of 135° in an area with a magnetic declination of N2°W:

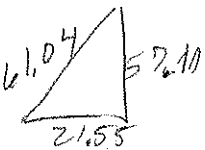
   135° + 2 = 137° Mag

   The equivalent Magnetic bearing is 180-137 = N43°E (5)



3. Suppose your traverse had a closure of -21.55 **links** in departure and +57.11 **links** in latitude over a traverse length of 305.20 **chains**:

   The linear precision is 1 in $\frac{0.6104}{305.20} = \frac{1}{500}$ chains? (4)



4. For a scale of 1: 15,840:

   a) The Equivalent Scale is: 1 inch = 1,320 feet = 2 chains (3)

   b) The Equivalent Scale is: 1 inch = 402.336 meters $\frac{15840 \times 2.54}{100} = 402.336$ (3)

   c) The area scale is 40 acres per square inch. $\frac{(1320)^2}{43560}$ or $\left(\frac{20}{10}\right)^2$ chains (3)

5. Your clinometer had a double error of +7.5 ft at a distance of 125 ft. when checked with the **peg method**. Using your clinometer with the **percent (i.e. 100 ft.) scale**, calculate the true/adjusted height of each tree below using the distance and clinometer readings supplied and the known error adjustment.

   % Error = $\frac{7.5/2}{125} = .03 \rightarrow 3\%$

   A. computed percent error of the clinometer is: 3 % (5)

   B. distance from tree = 128.5 feet

   reading to top tree = +65 reading to tree base = -5

   Corrected total tree height = 82.25 ft $= (1-.03)\left[\frac{128.5}{100}\right]\left(65^{\circ} - -5\right)$ (5)

   C. distance from tree = 125 links

   reading to top of tree = +70 reading to base of tree = + 5

   Corrected total tree height = 52.07 ft (5)

   $(1-.03)\left(\frac{82.5\text{ ft}}{100}\right)(70 - +5)$

6. Given the following information from a single growth sample tree:

Present diameter (i.b.) = 16.0 inches
Single (1X) Bark thickness = 0.7 inches
10 yr. radial growth (i.b.) = 1.5 inches
DOB as a function of DIB equation::
DOB(inches)= 0.08 + 1.15[DIB]

16 + 1.4 = 17.4 = dbh per rule
16 − 3.0 = 13.0
= 0.08 + 1.15(13.0)

A. The present DBH (o.b.) is 17.4 inches. 16 + 1.4 = 17.4 (3)

B. The DBH (i.b.) of the tree ten years ago was 13.0 inches. 16 − 3.0 = 13.0 (3)

C. The DBH (o.b.) of the tree ten years ago was 15.03 inches. .08 + 1.15(13.0) (3)

D. The **periodic** DBH (o.b.) growth of the tree is 2.37 inches/ 10 years. (3)
17.4 − 15.03 = 2.37

7. On a recent **1/5 acre plot cruise**, you tallied the following trees on **two plots**.

DBH	**#Trees**	**Vol per Tree**	PNCF	Trees	Volume
12	6	100 bd. ft	5	30	3000
14	4	125 bd. ft	5	20	2500
16	2	150 bd. ft	5	10	1500
				60	7000

Compute a **per acre stand and stock table** that also **includes basal area** : (2 decimals) (12)

DBH	Trees/ac	BA/ac	Vol/ac
12	15	11.78	1,500
14	10	10.66	1,250
16	5	6.96	750
TOTAL	30	29.4	3,500

.005454(D²)
.785376
1.06624
1.39264

A. The best estimate of mean volume per acre is 3,500 bd. ft per acre. (5)

B. The best estimate of mean basal area per acre is 29.4 sq. ft per acre. (5)

C. The average (i.e. quadratic mean) dbh of the tally was 13.72 inches. (5)

$12^2 * 15 = 2160$
$14^2 * 10 = 1960$
$16^2 * 5 = 1280$
5400 / 30 = 13.72

8. Given the following computations from a tree height-dbh regression exercise to fit the data to the linear regression model:

$$\mathbf{Ln(H) = b_0 + b_1\,(DBH^{-1})}$$

n = 20

$\sum X = 1.3967$ $\quad \sum Y = 90.1936$ $\quad \sum XY = 6.29049$

$\sum X^2 = 0.100$ $\quad \sum Y^2 = 406.7759$

$\bar{X} = 0.069835$ $\quad \bar{Y} = 4.50968$

$CSS_x = 0.00247$ $\quad CSS_y = 0.03184$ $\quad CSP_{xy} = -0.00821$

$b_1 = \frac{-0.00821}{0.00247} = -3.3239$

$b_0 = \left(\frac{90.1936}{20}\right) - (-3.3239)\left(\frac{1.3967}{20}\right)$

$= 4.50968 + (3.3239)(0.069835)$

$= 4.50968 + 0.23211$

$= 4.74179$

A. The final **linear regression equation** is: $\ln H = 4.7416 - 3.3239\,(DBH^{-1})$ (10)

B. The final **non-linear regression equation** is; $N = 114.67\,e^{\left(\frac{-3.3239}{DBH}\right)}$ (8)

9. A tree that is 95 feet in total height has a merchantable height of 4 - 16.0 ft. logs to an 8.0 inch top, a DBH_{ob}= 13.7 inches and a DBH_{ib}= 12.6 inches. The scaling diameters of the first 16.0 ft. log measures 12.8 inches, d.o.b., and 11.6 inches, d.i.b.

The Mesavage and Girard Form Class of this tree is calculated to be 84.7 ≈ 85 (4)

$FC = \frac{11.6}{13.7} \times 100 = 84.7$

Bonus: 10 points, all or none.

The total acres owned by the landowner in the following set of legal descriptions is 90 acres.

Parcel 1: NW 1/4 (10) of the NE 1/4 (40) of the NW 1/4 (160) of Section 18, T18N, R13E = 10

Parcel 2: E ½ (20) of NE 1/4 (40) of the NW 1/4 (160) of Section 18, T18N, R13E = 20

Parcel 3: SW 1/4 (40) of the NE 1/4 (160) of Section 18, T18N, R13E = 40

Parcel 4: N ½ (20) of the NW 1/4 (40) of the SE 1/4 (160) of Section 18, T18N, R13E = 20

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