Name: Key

EXAM 1-10

FO-3015 Forest Description and Analysis

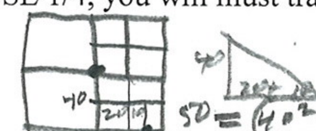
1. If you have paced 5.0 chains in 60 paces, $60/5 = 12$

   a) Your average number of paces per chain is 12. (2)

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

   50 chains with (2)

   600 paces (2)



$50 = (40^2 + 30^2)^{1/2}$

2. Given a **magnetic bearing** of S35° E in an area with a magnetic declination of N2°E:

   180 − 35 = 145 − S38°EM = 145° AZ + 2 = 147

   S35°E M = S33°E True

   The equivalent **True Azimuth** is 147° (5)

180 − 33 = 147

3. Suppose your traverse had a closure of -25.45 **links** in departure and +55.28 **links** in latitude over a traverse length of 320.0 **chains**:

   $\text{Closure} = \sqrt{-25.45^2 + 55.28^2} = 60.857 \text{ LKs}$ .60

   The linear precision is 1 in 525.82 chains? (4) $\frac{1}{\text{Prec}} = \frac{.60857 \text{ ch.}}{320. \text{ ch}}$

4. For a scale of 1: 7,920:

   a) The Equivalent Scale is: 1 inch = 660 feet 10 chain/in (3)

   b) The Equivalent Scale is: 1 inch = 201.168 meters (3)

   c) The area scale is 10 acres per square inch. $10^2 = 100/10 = 10$ ac (3)

5. Your clinometer had a double error of **-10.0 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.

   $\text{Err} = \frac{-5}{125}$

   A. computed percent error of the clinometer is: -4.0 % (5)

   B. distance from tree = 128.5 feet
   reading to top tree = +65 reading to tree base = +5
   Corrected total tree height = 80.2 ft $= (1-(-.04))\left[\frac{128.5}{100}\right][65-5]$ (5)

   C. distance from tree = 125 links
   reading to top of tree = +70 reading to base of tree= - 5
   Corrected total tree height = 64.35 ft (5)

   $= (1.04)\frac{125(.66)}{100}[70 \pm -5]$

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

Present DBH = 17.4 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)= 0.00 + 1.0875[DIB]

A. The present DBH (i.b.) is 16.0 inches. $17.4 - 2(0.7) = 16.0$ (3)

B. The DBH (i.b.) of the tree ten years ago was 13.0 inches. $16.0 - 2(1.5) = 13$ (3)

C. The DBH (o.b.) of the tree ten years ago was 14.14 inches. $= 1.0875(13)$ (3)

D. The **periodic** DBH (o.b.) growth of the tree is 3.26 inches/ 10 years. (3)

7. On a recent **1/10 acre plot cruise**, you tallied the following trees on **10 plots**.

DBH	**#Trees**	**Vol per Tree**	PACF	Trees/ac ÷ plots		Vol/ac
12	12	100 bd. ft	10	120	12	1200
14	8	125 bd. ft	10	80	8	1000
16	4	150 bd. ft	10	40	4	600
						2800

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

DBH	Trees/ac	BA/ac	Vol/ac
12	12	9.42	1200
14	8	8.55	1000
16	4	5.58	600
Total	24	23.55	2800

A. The best estimate of mean volume per acre is 2800 bd. ft per acre. (5)

B. The best estimate of mean basal area per acre is 23.55 sq. ft per acre. (5)

C. The average (i.e. quadratic mean) dbh of the tally was 13.4 inches. (5)

$$\bar{D}_{Qm} = \sqrt{\frac{23.55}{24} / 0.005454} = 13.4$$

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

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

$n = 20$		
$\sum X = 1.3967$	$\sum Y = 90.1936$	$\sum XY = 6.29049$
$\bar{X} = 0.069835$	$\bar{Y} = 4.50968$	
$\sum X^2 = 0.100$	$\sum Y^2 = 406.7759$	
$CSS_x = 0.00247$	$CSS_y = 0.03184$	$CSP_{xy} = -0.00821$

$b_1 = \frac{CSP_{xy}}{CSS_x} = \frac{-0.00821}{0.00247} = -3.3239$

$b_0 = 4.50968 - (-3.3239)(0.069835) = 4.7418$

A. The final **linear regression equation** is: $\ln H = 4.7418 - 3.3239(DBH^{-1})$ (10)

B. The final **non-linear regression equation** is; $H = e^{4.7418}\, e^{\left(\frac{-3.3239}{DBH}\right)}$ (8)

$H = 114.602\, e^{\left(\frac{-3.3239}{DBH}\right)}$

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 11.8 inches, d.o.b., and 10.7 inches, d.i.b.

The Mesavage and Girard Form Class of this tree is calculated to be 78% (4)

$FC\% = \frac{10.7}{13.7} \times 100 = 78.1\%$

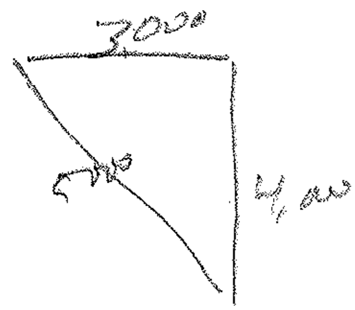
Bonus: 10 points, all or none.

Given the UTM coordinates of Point A and B as:

Point A:	325,560 E ,	3,645,400 N
Point B:	328,560 E ,	3,641,400 N

The distance from A to B is: 248.55 chains.

$\frac{5000\text{ m} \times 100\text{ cm/m}}{2.54\text{ cm/in}} \Big/ 12\text{ in/ft} \Big/ 66\text{ ft/ch}$



Statistical Formulas

$$s^2 = \frac{\sum_{k=1}^{n} x_i^2 - \frac{\left(\sum_{k=1}^{n} x_i\right)^2}{n}}{n-1}$$

$$s_{\bar{x}} = \sqrt{\frac{s^2}{n}\left(1 - \frac{n}{N}\right)}$$

$$SE\% = \left(\frac{t_{n-1,\alpha} s_{\bar{x}}}{\bar{x}}\right) * 100\%$$

$$\bar{x} \pm (t_{n-1,\alpha}) s_{\bar{x}}$$

$$CV\% = \frac{\sqrt{s^2}}{\bar{x}} * (100\%)$$

$$EC = \sqrt{(Sum\ \ of\ \ departures)^2 + (Sum\ \ of\ \ latitudes)^2}$$

$$Precision = 1\ :\ (Total\ \ course\ \ length)/(Closure\ \ error)$$

$$PACF = \frac{1}{plot\ size}$$

$$plot\ size = \frac{ha}{BAF}$$

$$CSS_y:\ \sum y^2 = \sum Y^2 - \frac{(\sum Y)^2}{n}$$

$$CSS_x:\ \sum x^2 = \sum X^2 - \frac{(\sum X)^2}{n}$$

$$CSP_{xy}:\ \sum xy = \sum XY - \frac{\sum X \sum Y}{n}$$

$$b_1 = \frac{\sum xy}{\sum x^2} = \frac{CSP_{xy}}{CSS_x}$$

$$b_0 = \bar{Y} - b_1 \bar{X}$$

$$TSS = CSS_y = \sum y^2$$

$$ESS = \sum (Y - \hat{Y})^2$$

$$RSS = \frac{(CSP_{xy})^2}{CSS_x} = \frac{(\sum xy)^2}{\sum x^2} = b_1 \sum xy$$

$$I^2 = \left(1 - \frac{Error\ SS\ (ESS)}{Total\ SS\ (TSS)}\right)$$