Name: _____

EXAM 1-02

FO-3014 Forest Description and Analysis

1. If you have paced 5.0 chains in 55 paces,

   a) Your average number of paces per chain is _____. (3)

   b) The average length of one pace, in feet, is _____. (3)

2. Given a **magnetic azimuth** of 165° in an area with a magnetic declination of N5°E:

   The equivalent Magnetic bearing is _____ (4)

3. The UTM coordinates for Point A and B are:

   A. 332,500.8 mE 3,826,525.7mN
   B. 329, 500.8mE 3,822,525.7mN

   a) The direct distance from Point A to Point B is _____ chains (4)

   b) The bearing from Point A to Point B (degrees and minutes) is: _____ (4)

4. Suppose your traverse had a total perimeter of 487.5 chains and the calculations showed a linear closure error of 85.7 links;

   The linear precision is 1 in _____ chains? (4)

5. For a scale of 1:36,000:

a) The Equivalent Scale is: 1 inch = _____ feet (3)

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

c) The area scale is _____ acres per square inch. (3)

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

Present diameter (i.b.) = 18.0 inches
10 yr. radial growth (i.b.) = 2.5 inches
Single (1X) Bark thickness = 0.9 inches

Double bark thickness equation:
2X Bark = 0.1 inch per 1.0 inch of diameter (i.b.)

a) The present DBH (o.b.) is _____ inches. (2)

b) The DBH (i.b.) of the tree ten years ago was _____ inches. (2)

c) The DBH (o.b.) of the tree ten years ago was _____ inches. (2)

d) The annual DBH (o.b.) growth of the tree is _____ inches/year. (2)

7. Using your clinometer with the percent (i.e. 100 ft.) scale, calculate the height of each tree below using the distance and clinometer readings supplied:

a) distance from tree = 147 feet

sum of readings (to top and bottom of tree) = +50

total tree height = _____ ft (4)

b) distance from tree = 90 feet

reading to top of tree = +70

reading to base of tree= + 5

total tree height = _____ ft (4)

c) distance from tree = 128

reading to top of tree = +65

reading to base of tree= - 5

total tree height = _____ ft (4)

8. 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}= 14.7 inches and a DBH_{ib}= 12.6 inches. The scaling diameters of the first 16.0 ft. log measures 13.8 inches, d.o.b., and 12.1 inches, d.i.b.

The Mesavage and Girard Form Class of this tree is calculated to be _____ (3)

9. Complete the following table of dbh class intervals for 1- and 2-inch dbh classes: (7)

	1-inch classes		2-inch classes	
DBH Class	Min	Max	Min	Max
6	___	___	___	___
10	___	___	___	___
13	___	___		
14	___	___	___	___

10. You have completed a theoretical 10% strip cruise of 20 acres using 1.0 chain wide segments of 2 chains length each on lines spaced at 5 chain intervals. Sawtimber was tallied on the entire strip width (i.e. 1.0 chain width) and pulpwood was tallied on the left half (i.e. 0.50 chain width) of each strip segment. The volumes for the five strip segments tallied are given below:

Segment no.	Pulp Vol. (cords)	Sawtimber Vol. (bd.ft.)
1	2.5	900
2	2.2	700
3	2.8	800
4	2.8	860
5	1.7	740
Totals	12.0	4000

a) The mean pulpwood volume per acre for the cruise is _____ cords per acre. (4)

b) The mean sawtimber volume per acre for the cruise is _____ bd.ft. per acre. (4)

11. Your boss hands you a timber cruise report from Mad Dog Consulting Firm out of Oxford, MS which contains the following verbage:

> A timber cruise with 60 one-fifth acre (0.2 ac) plots was conducted on 160 acres of the Rebel Tree Farm. The mean volume per acre for pine sawtimber was 4,500 board feet, Doyle log scale, with a standard deviation of ±2,150 board feet.

Since you are a recent MSU Forestry Graduate, he asks you the following question "Was that a good cruise? Can you calculate a number that tells me how good/bad the cruise was?"

The number you can calculate is: Name: _____ Value: _____ (8)

Is this good or bad? Why?_____

_____ (3)

12. You have completed a segmented strip cruise using 1 chain wide strips and 5 chain segment lengths on a 40 acre tract. The tally and segment volumes for the ten (10) segments are shown below.

A. The mean sawtimber volume per acre is _____ board feet (5)

B. The sampling error of the mean volume per acre at the 95% confidence level is _____ percent (5)

C. The stand table entry for 12 inch dbh trees is _____ (5)

D. The stock table entry for 12 inch dbh trees is _____ (5)

Segment	DBH	Vol/tree	Trees	Total Vol		Segment	DBH	Vol/tree	Trees	Total Vol
1	10	20	1	20		6	14	100	4	400
	12	50	3	150			12	50	4	200
	14	100	1	100			16	160	3	480
	16	160	3	480					**11**	**1080**
	18	260	1	260						
			9	**1010**						
2	16	160	2	320		7	16	160	1	160
	14	100	5	500			12	50	3	150
	12	50	4	200			18	260	3	780
	10	20	5	100			14	100	3	300
			16	**1120**					**10**	**1390**
3	18	260	2	520		8	18	260	3	780
	16	160	3	480			14	100	2	200
	12	50	1	50			16	160	1	160
	14	100	3	300			12	50	3	150
			9	**1350**			10	20	2	40
									11	**1330**
4	14	100	1	100						
	12	50	2	100		9	10	20	2	40
	16	160	2	320			18	260	3	780
	18	260	2	520			16	160	2	320
			7	**1040**			14	100	2	200
									9	**1340**
5	14	100	2	200		10	18	260	2	520
	18	260	3	780			14	100	3	300
	12	50	1	50			12	50	4	200
			6	**1030**			10	20	2	40
									11	**1060**

Partial Computations: (segment/plot basis)

$$\sum_{k=1}^{n} x_i = 11{,}750$$

$$\sum_{k=1}^{n} x_i^2 = 14{,}026{,}100$$

Bonus: 5 points, all or none.

You measured dbhes and merchantable heights (in feet to an 8.0 inch top, ob) on sample trees and computed the following local volume equation:

Doyle to 8 inch top = -45.45 + 0.010743(D^2H)

where H is merchantable feet to 8" top

But, when the cruise was completed, you realized the cruiser(s) recorded tree heights in number of 16 ft logs and half logs. What to do? Yes! I will convert the volume equation above so it will predict Doyle volume from dbh and number of 16 ft logs and half logs. The resulting equation will be:

Doyle to 8 inch top = _____ + _____ (D^2MH)

where MH is number of logs and half logs to an 8" top

Statistical Formulas

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

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

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

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

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

Student's t-Table

Forest Description and Analysis

The Distribution of Probability

df	0.5	0.4	0.3	0.2	0.1	0.05	0.02	0.01	0.001
1	1.000	1.376	1.963	3.078	6.314	12.706	31.821	63.657	636.619
2	0.819	1.061	1.386	1.886	2.920	4.303	6.965	9.925	31.598
3	0.765	0.978	1.250	1.638	2.353	3.182	4.541	5.841	12.941
4	0.741	0.941	1.190	1.533	2.132	2.776	3.747	4.604	8.610
5	0.727	0.920	1.156	1.476	2.015	2.571	3.365	4.032	6.856
6	0.718	0.906	1.134	1.440	1.943	2.447	3.143	3.707	5.959
7	0.711	0.896	1.119	1.415	1.895	2.365	2.998	3.499	5.405
8	0.706	0.889	1.108	1.397	1.860	2.306	2.896	3.355	5.041
9	0.703	0.883	1.100	1.383	1.833	2.262	2.821	3.250	4.781
10	0.700	0.879	1.093	1.372	1.812	2.228	2.764	3.169	4.587
11	0.697	0.876	1.088	1.363	1.769	2.201	2.718	3.106	4.437
12	0.695	0.873	1.083	1.356	1.782	2.179	2.681	3.055	4.318
13	0.694	0.870	1.079	1.350	1.771	2.160	2.650	3.012	4.221
14	0.692	0.868	1.076	1.345	1.761	2.145	2.624	2.977	4.140
15	0.691	0.866	1.074	1.341	1.753	2.131	2.602	2.947	4.073
16	0.690	0.865	1.071	1.337	1.746	2.120	2.583	2.921	4.015
17	0.689	0.863	1.069	1.333	1.740	2.110	2.567	2.898	3.965
18	0.688	0.862	1.067	1.330	1.734	2.101	2.552	2.878	3.922
19	0.688	0.861	1.066	1.328	1.729	2.093	2.539	2.861	3.883
20	0.687	0.860	1.064	1.325	1.725	2.086	2.528	2.845	3.850
21	0.686	0.859	1.063	1.323	1.721	2.080	2.518	2.831	3.819
22	0.686	0.858	1.061	1.321	1.717	2.074	2.508	2.819	3.792
23	0.685	0.858	1.060	1.319	1.714	2.069	2.500	2.807	3.767
24	0.685	0.857	1.059	1.318	1.711	2.064	2.492	2.797	3.745
25	0.684	0.856	1.058	1.316	1.708	2.060	2.485	2.787	3.725
26	0.684	0.856	1.058	1.315	1.706	2.056	2.479	2.779	3.707
27	0.684	0.855	1.057	1.314	1.703	2.052	2.473	2.771	3.690
28	0.683	0.855	1.056	1.313	1.701	2.048	2.467	2.763	3.674
29	0.683	0.854	1.055	1.311	1.699	2.045	2.462	2.756	3.659
30	0.683	0.854	1.055	1.310	1.697	2.042	2.457	2.750	3.646
40	0.681	0.851	1.050	1.303	1.684	2.021	2.423	2.704	3.551
60	0.679	0.848	1.046	1.296	1.671	2.000	2.390	2.660	3.460
120	0.677	0.845	1.041	1.289	1.658	1.980	2.358	2.617	3.373
∞	0.674	0.842	1.036	1.282	1.645	1.960	2.326	2.576	3.291