Spring 2013 Stat 145 Final (100 pts.) - **Name:**_____ **Section:**_____

Circle your section & instructor below:

001 MWF 8:00 A. Macias	004 TR 9:30 P. Fawcett	007 MWF 11:00 N. Greenberg	010 TR 12:30 A. Sukhinin	014 TR 2:00 P. Fawcett	017 TR 7:00 N. Jadalla	021 MWF 10:00 X. Wang
002 TR 8:00 E. Smith	005 MWF 10:00 N. Greenberg	008 TR 11:00 B. Brown	011 MWF 1:00 K. Burns	015 TR 2:00 K. Rechard	018 TR 2:30 G. Unnever	022 MW 12:00 B. Brown
003 MWF 9:00 N. Greenberg	006 MWF 11:00 Y. Wei	009 TR 11:00 M. Arbabshirani	013 MWF 2:00 H. Jiang	016 MW 5:30 P. Buser	020 MWF 12:00 K. Burns	

Where appropriate, show work or explain answers and <u>place final answers in the boxes provided</u>.

1. A tobacco company claims that its best-selling cigarettes contain at most 40 mg of nicotine. The average nicotine content from a simple random sample 15 cigarettes is 42.6 mg with a standard deviation (s) of 3.7 mg. Is this evidence the nicotine content of the cigarettes exceeds 40 mg? Assume cigarette nicotine content is distributed normally. Use a 1% level of significance (α=0.01) to carry out the appropriate test of significance.

(a) (4 pts.) State your hypotheses using mathematical notation:

(b) (4 pts.) Interpret the null hypothesis (i.e. say what it means).

(c) (4 pts.) Calculate the test statistic:

(d) (4 pts.) Determine the p-value:

(e) (4 pts.) State your conclusion in terms of the problem:

2. The number of calories in five randomly selected 1-ounce chocolate chip cookies of various brands was measured. The recorded number of calories for each cookie is: 125, 150, 185, 110, and 140.

(a.) (4 pts.) Calculate the mean number of calories in the cookies. Include units in your final answer. SHOW WORK

Mean: _____

(b.) (4 pts.) Calculate the standard deviation of calories in the cookies. Include units in your final answer. Round your final answer to the closest whole calorie. SHOW WORK

Std. Dev.: _____

3. Monthly cell phone bills rounded to the nearest whole dollar were recorded for 12 randomly selected individuals. The results are:

56	50	63	70	60	42
49	52	58	19	64	55

(a). (4 pts.) Create a stemplot of these cell phone bills.

(b). (4 pts.) From your stemplot above, explain if it is or is not safe to use a t-procedure to analyze these data.

4. Annual earnings of college graduates aged 25-to-34 was recorded in a simple random sample of 40 males and a simple random sample of 35 females. The summary statistics are:

	n	$\bar{x}$	s
males	40	$59,235	$8,945
females	35	$52,487	$10,125

(a) (6 pts.) Construct a 95% confidence interval for the mean difference in male and female annual salaries, rounded to the nearest dollar.

(b) (6 pts.) Interpret the confidence interval above.

5. (4 pts.) Nationally, the proportion of high school graduates who take the SAT is between .3 and .7. How large a sample is necessary to estimate the true proportion of high school graduates who take the SAT within 2.5 percentage points (i.e. ± 0.025) with 90% confidence?

Multiple Choice (4 pts. each part):

6. A book publisher wants to know if there is a relationship between gender and book-type preferences in recreational readers. Recreational readers in a simple random sample were asked if they prefer reading mysteries, romance novels, or self-help books. The following table lists the resulting number of respondents, by gender and book type. Use these results for parts (a) through (d). **SHOW WORK**.

	Mystery	Romance	Self-help	Row Totals
Male	243	201	191	635
Female	135	149	202	486
Column Totals	378	350	393	1121

(a) Rounded to the nearest whole number, how many males would prefer reading self-help books if there is no relationship between gender and reading preference? SHOW WORK

A) 111
B) 191
C) 223
D) 620

(b) Rounded to the nearest whole number, the expected number of females who prefer romance is 152. What is their contribution to the chi-square test statistic? SHOW WORK

A) 9
B) 3
C) 0.06
D) 0.02

(c) Suppose the chi-square value for this test was 7.43, using the appropriate table, what is the corresponding p-value?

A) $.25<p$
B) $.01<p<.02$
C) $.02<p<.025$
D) $.025<p<.04$

(d) If the p-value for this test is significant we conclude:

A) There is no evidence for a relationship between gender and reading preference.
B) There is evidence for a relationship between gender and reading preference.
C) There is no evidence gender determines reading preference.
D) There is evidence gender determines reading preference.

7. A dietician claims that 60% of people in the U.S. are trying to avoid trans fats in their diets. You randomly select 100 people and find that 58 of them are trying to avoid trans fats. Use this information for questions (a) and (b) below.

(a) In a test of significance seeking evidence against the dietician's claim, the alternative hypothesis is

A) Ha: $p \neq 58$
B) Ha: $\mu \neq 60$
C) Ha: $p \neq 0.58$
D) Ha: $p \neq 0.60$

(b) Using the appropriate table, if the test statistic was -0.41 the p-value would be:

A) $0.25< p <0.5$
B) $p<0.25$
C) $p = 0.3409$
D) $p = 0.6818$

8. **SHOW WORK**. An SRS of 18 recent birth records at the local hospital was selected. In the sample, the average birth weight was 119.6 ounces and the standard deviation was 6.5 ounces. Assume that in the population of all babies born in this hospital, the birth weights follow a Normal distribution, with mean μ. The standard error of the mean is

A) 6.50 ounces
B) 1.53 ounces
C) 0.36 ounces
D) 0.02 ounces

9. Do SAT coaching classes work? Do they help students to improve their test scores? Four students were selected randomly from all of the students that completed an SAT coaching class. For each student, we recorded their first SAT score (before the class) and their second SAT score (after the coaching class).

Student:	1	2	3	4
First SAT score	920	830	960	910
Second SAT score	1010	800	1000	980

To analyze these data we should use

A) the one-sample *t* test.
B) the matched pairs *t* test.
C) the two-sample *t* test.
D) Any of the above tests are valid. It just needs to be a *t* since σ is unknown.

10. In a test of significance, the *P*-value is

A) the probability the null hypothesis is true.
B) the probability the null hypothesis is false.
C) the probability, assuming the null hypothesis is true, that the test statistic will take a value at least as extreme as that actually observed.
D) the probability, assuming the null hypothesis is false, that the test statistic will take a value at least as extreme as that actually observed.

11. If conditions for inference were met and the true population standard deviation (σ) was known, the test statistic used for inference for a single true mean (μ) of a population is:

A) p
B) χ^2
C) t
D) z

12. The variability of a statistic is described by

A) the spread of its sampling distribution.
B) the amount of bias present.
C) the vagueness in the wording of the question used to collect the sample data.
D) the stability of the population it describes.

13. You conduct a statistical test of hypotheses and find that the null hypothesis is statistically significant at level $\alpha = 0.05$. You may conclude that

A) the test would also be significant at level $\alpha = 0.10$.
B) the test would also be significant at level $\alpha = 0.01$.
C) both a and b are true.
D) neither a nor b is true.