* please also refer to my NOTES *

Statistics II Sample Project/Practice Midterm **Ch 10-14** **Name** Key

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Show all work as done on my materials.
Assume all populations normal.

1. a) The table below shows the weights of seven subjects before and after following a particular diet for two months. Using a .01 level of significance, test the claim that the diet is effective in reducing weight.

Subject	*A*	*B*	*C*	*D*	*E*	*F*	*G*
Before	187	156	153	194	195	179	157
After	180	147	151	199	181	181	145

Did you subtract before – after **or** after – before? before - after

claim	$\mu_d > 0$
null hypothesis.....	$\mu_d = 0$
alternative hypothesis.....	$\mu_d > 0$
Calculator Screen Name.....	t test
test statistic	$t = 1.95$
pvalue/alpha comparison.....	$p = .04 > \alpha = .01$
decision	do not reject H_0
Conclusion	There is not enough evidence to support claim.

after - before

$\mu_d < 0$

$\mu_d = 0$

$\mu_d < 0$

$t = -1.95$

b) Construct a 98% confidence interval for, μ_d. Interpret the interval in a complete sentence.

Confidence Interval Name t interval

Interval (-3.217, 13.788)

t interval

(-13.788, 3.217)

Interpret We are 98% confident the true value of μ_d lies in the interval

2. A random sample of 16 women resulted in blood pressure levels with a standard deviation of 21.9 mm Hg. A random sample of 17 men resulted in blood pressure levels with a standard deviation of 20 mm Hg. Use a .025 significance level to test the claim that the blood pressure level for women has a larger variance than those for men. Use women as group one.

claim ..... $\sigma_1^2 > \sigma_2^2$

null hypothesis..... $\sigma_1^2 = \sigma_2^2$

alternative hypothesis..... $\sigma_1^2 > \sigma_2^2$

Calculator Screen Name..... 2 Samp F Test

test statistic ..... $F = 1.20$

pvalue/alpha comparison..... $p = .3605 > \alpha = .025$

decision ..... do not reject H_0

Conclusion .....There is not enough evidence to support the claim.

3. a) The Better Cookie Company claims its chocolate chip cookies have more chips than another chocolate chip cookie. 120 Better Cookies and 100 of the other type of cookie were randomly selected and the number of chips in each cookie was recorded.

	Better	*Another*
Sample Mean # ChocChips	7.6	6.9
population SD	1.4	1.7

At the .02 level of significance test the claim that the population of Better Cookies has a higher mean number of chips. Group one is Better Cookies.

claim ..... $\mu_1 > \mu_2$

null hypothesis..... $\mu_1 = \mu_2$

alternative hypothesis..... $\mu_1 > \mu_2$

Calculator Screen Name..... 2 Samp Z test

test statistic ..... $z = 3.29$

pvalue/alpha comparison..... $p = 4.99E-4 < \alpha = .02$

decision ..... reject H_0

Conclusion .....The Sample data supports the claim.

b) Construct a 96% confidence interval for $\mu_1 - \mu_2$. Interpret the interval.

Confidence Interval Name 2 Samp Z Int

Interval (.26321, 1.13368)

Interpret We are 96% confident that the true value of $\mu_1 - \mu_2$ lies in the interval.

4. a) Test the claim that the mean for Sample A is less than Sample B at the .01 significance level. Assume both populations normal and the variances are equal.

Sample A	*Sample B*
$\bar{x}_1 = 24.7$	$\bar{x}_2 = 24.6$
$s_1 = 5.7$	$s_2 = 4.2$
$n_1 = 10$	$n_2 = 8$

claim	$\mu_1 < \mu_2$
null hypothesis.....	$\mu_1 = \mu_2$
alternative hypothesis.....	$\mu_1 < \mu_2$
Calculator Screen Name.....	2 Samp t test
test statistic	$t = .041$
pvalue/alpha comparison.....	$p = .5162 > \alpha = .01$
decision	do not reject H_0
Conclusion	There is not enough evidence to support the claim.

b) Construct a 98% confidence interval for $\mu_1 - \mu_2$ based on the sample data above. Interpret the interval in a complete sentence.

Confidence Interval Name 2 Samp t interval

Interval (-6.148, 6.3478)

Interpret We are 98% confident that the true value of $\mu_1 - \mu_2$ lies in the interval.

5 a) A sample of 50 randomly selected men with high triglyceride levels consumed 2 tablespoons of oat bran daily for 6 weeks. After 6 weeks, 60% of the men had lowered their triglyceride level. A sample of 80 men consumed 2 tablespoons of wheat bran for six weeks. After six weeks, 25% had lower triglyceride levels. Test the claim that there is a significant difference in the two proportions at the .01 level. Let Oat Bran be Group 1.

$n_1 = 50$
$\hat{p}_1 = .60$
$x_1 = 30$

$n_2 = 80$
$\hat{p}_2 = .25$
$x_2 = 20$

claim	$p_1 \neq p_2$
null hypothesis.....	$p_1 = p_2$
alternative hypothesis.....	$p_1 \neq p_2$
Calculator Screen Name.....	2 prop z test
test statistic	$z = 3.99$
pvalue/alpha comparison.....	$p = 6.59E\text{-}5 < \alpha = .01$
decision	reject the
Conclusion	there is enough evidence to support the claim.

b) Construct a 99% confidence interval for $p_1 - p_2$. Interpret the interval in a complete sentence.

Confidence Interval Name 2 prop z int

Interval (.13229, .56771)

Interpret We are 99% confident that the true value of $p_1 - p_2$ lies in the interval.

6 a) Test the claim that populations A and B have equal means. Use the .05 level. Assume the variances are not equal and populations normal.

do not pool

Sample A	*Sample B*
$n_1 = 32$	$n_2 = 37$
$\bar{x}_1 = 130$	$\bar{x}_2 = 160$
$s_1 = 65$	$s_2 = 30$

claim ..... $\mu_1 = \mu_2$

null hypothesis..... $\mu_1 = \mu_2$

alternative hypothesis..... $\mu_1 \neq \mu_2$

Calculator Screen Name..... 2 Samp t test

test statistic ..... $t = -2.40$

pvalue/alpha comparison..... $p = .02 < \alpha = .05$

decision ..... reject H_0

Conclusion ..... There is enough evidence to reject the claim.

b) Construct a 95% confidence interval for $\mu_1 - \mu_2$. Interpret the interval in a complete sentence.

Confidence Interval Name 2 Samp t interval

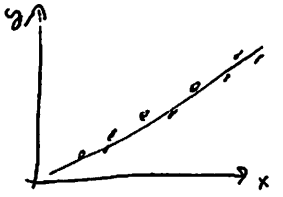
Interval (-55.23, -4.77)

Interpret We are 95% confident the true value of $\mu_1 - \mu_2$ lies in the interval.

7.Listed below are results from two different tests designed to measure productivity and dexterity for randomly selected employees.

Pr*oductivity*(x)	59	63	65	69	58	77	76	69	70	64
Dexterity(y)	72	67	78	82	75	87	92	83	87	78

a. Plot the scatter diagram below. Label x and y axes. Do a rough sketch.



b. Find the value of the linear correlation coefficient r by the TI83 shortcut- state calculator screen name

LinReg L1, L2, Y1 r=.8632

c) Test the claim of no linear relation by the TI83 p-value method. $\alpha = .05$

claim ..... $\rho = 0$

null hypothesis..... $\rho = 0$

alternative hypothesis..... $\rho \neq 0$

Calculator Screen Name..... LinReg t test

test statistic ..... $t = 4.84$

pvalue/alpha comparison..... $p = .0013 < \alpha = .05$

decision ..... reject H_0

Conclusion .....There is enough evidence to reject the claim

d) Find the estimated **equation** of the regression line by TI83 shortcut

$\hat{y} = 11.66 + 1.02x$

e) Plot the regression line on the scatter diagram in part a). ✓

f) Assuming a significant linear correlation, predict the score a student would get on dexterity, given he got a 80 on productivity.

$\hat{y}_1(80) = 93.38$

g) What percentage of the total variation can be explained by the regression line?

$r^2 = .7452$

8. Responses to a survey question are broken down according to employment and the sample results are given below. At the .10 level of significance, test the claim that the response and employment are independent.

	Yes	*No*	*Undecided*
employed	15	35	20
unemployed	25	25	10

claim ..... response & employment are independent

null hypothesis.....

alternative hypothesis..... response & employment are dependent

Calculator Screen Name..... χ^2 test

test statistic ..... $\chi^2 = 6.77$

pvalue/alpha comparison..... $p = .03 < \alpha = .10$

decision ..... reject H_0

Conclusion ..... There is enough evidence to reject the claim.

9. In analyzing the random number generator of a certain computer, the following results were obtained. At the .05 significance level, test the claim that the outcomes occur with the percentages 20%, 10%, 15%, 15%, 20%, 20%. → L_2

$L_3 = \text{sum}(L_1) * L_2$

outcome	1	2	3	4	5	6
frequency	18	12	14	16	21	15 → L_4

claim ..... The distribution is as stated.

null hypothesis.....

alternative hypothesis... The distribution is not as stated.

Calculator Screen Name... GOF test (@) GOF program (QR) $\chi^2 = \text{sum}(L_4)$

test statistic ..... $\chi^2 = 1.95$

pvalue/alpha comparison..... $p = .8567 > \alpha = .05$

decision ..... do not reject H_0

Conclusion ..... There is not enough evidence to reject the claim.

For long way

$L_4 = (L_1 - L_3)^2 \div L_3$

$p = \chi^2\text{cdf}(1.95, E99, 5) = .8560$

10. At the .01 significance level, test the claim that the three brands have the same mean level if the following sample results have been obtained.

BrandA	*BrandB*	*BrandC*
44	30	28
47	32	27
44	34	31
40	36	32
39	38	36
	40	
	42	

claim ..... $\mu_A = \mu_B = \mu_C$

null hypothesis.....

alternative hypothesis..... at least one mean is different

Calculator Screen Name..... Anova

test statistic ..... $F = 12.35$

pvalue/alpha comparison..... $p = 8.12E-4 < \alpha = .01$

decision ..... reject Ho

Conclusion ..... There is enough evidence to reject the claim.