Math 10 – Ch 7 Review Name KEY (#22)

1. For each question: 1) State the Null and Alternative Hypothesis in population parameters and 2) Select the correct model from the list. 3) Determine degrees of freedom for the test statistic, if possible. This question is about design only since no data will be provided. **If it is necessary to make assumption about population variances, assume equal variances.**

a. A company tests for a difference in mean sales at two locations. Data is collected at each store for each month in 2012, so there are 12 pairs of measurements. degrees of freedom $n-1=11$ Ho $\mu_d = 0$ Ha $\mu_d \neq 0$	○ One population, Z test for mean ○ One population, t test for mean ○ One population, Z test of proportion ○ One population, Chi-square test of variance ○ Z-test: comparing two independent population means ○ t-test: independent samples, two population pooled variance. ○ t-test: independent samples, two population unequal variance. ● t-test: dependent sampling, matched pairs ○ F-test for comparing two variances
b. A study claims 30% of adults get news from television. You sample 1000 adults to attempt to disprove this claim. degrees of freedom N/A Ho $p = .3$ Ha $p \neq .3$	○ One population, Z test for mean ○ One population, t test for mean ● One population, Z test of proportion ○ One population, Chi-square test of variance ○ Z-test: comparing two independent population means ○ t-test: independent samples, two population pooled variance. ○ t-test: independent samples, two population unequal variance. ○ t-test: dependent sampling, matched pairs ○ F-test for comparing two variance
c. You want to support the Hypothesis that students study more than 10 hours per week. You will sample 17 students to test this claim. degrees of freedom $n-1=16$ Ho $\mu \leq 10$ Ha $\mu > 10$	○ One population, Z test for mean ● One population, t test for mean ○ One population, Z test of proportion ○ One population, Chi-square test of variance ○ Z-test: comparing two independent population means ○ t-test: independent samples, two population pooled variance. ○ t-test: independent samples, two population unequal variance. ○ t-test: dependent sampling, matched pairs ○ F-test for comparing two variances
d. You sample 20 mutual funds and want to support the claim that the standard deviation is under 10. degrees of freedom $n-1=19$ Ho $\sigma \geq 10$ Ha $\sigma < 10$	○ One population, Z test for mean ○ One population, t test for mean ○ One population, Z test of proportion ● One population, Chi-square test of variance ○ Z-test: comparing two independent population means ○ t-test: independent samples, two population pooled variance. ○ t-test: independent samples, two population unequal variance. ○ t-test: dependent sampling, matched pairs ○ F-test for comparing two variances

2. **(15 pts)** A high school claims that boys studied less often than girls. 16 boys and 16 girls were sampled and the mean number of hours they studied in the last week was determined. Results are shown below, along with the p-values of many tests. Can you support the high school's claim at a significance level of 10%?

	1	2
	boys	girls
mean	9.88	12.06
std dev	4.62	4.23
n	16	16

Reported p-values	two tail	lower tail	upper tail
F-test comparing two varainces	0.7419		
Pooled Variance t-test	0.1727	0.0864	0.9136
Unequal Variance t-test	0.1731	0.0865	0.9135
Matched Pairs t-test	0.2058	0.1029	0.8971

DESIGN 1: State your Hypotheses 1 = boys 2 = girls

$H_0: \mu_1 \geq \mu_2$

$H_a: \mu_1 < \mu_2$

DATA: Conduct the test and **circle** your decision (p-values for various tests are shown above)

pvalue = .0864

(Reject Ho) Fail to Reject Ho

DESIGN 2: State Significance Level and Decision Rule (p-value Method)

$\alpha = .10$

Reject Ho if pvalue $< \alpha$

CONCLUSION: State your overall conclusion in language that is clear, relates to the original problem and is consistent with your decision.

Boys study less often than girls.

DESIGN 3: Determine which of these 3 models you are using. (circle one answer). Justify your reasons for choosing the model

(a.) Pooled variance t-test

b. Unequal variance t-test

c. Matched pairs t-test

Independent sampling
Assume $\sigma_1 = \sigma_2$ since
F test for comparing variances
shows pvalue = .7419,
meaning no significant
difference of variances.