* SOLUTIONS B *

Q1. Answer the following questions by indicating it as **True** or **False**, and if it is false correct it just below to it:

F **1.** If a hypothesis test leads to incorrectly rejecting the null hypothesis, a Type II statistical error has been made.

1 False (Type-I statistical error) 1

T **2.** A confidence interval estimation for the difference between two population proportions $P_1 - P_2$ can be used to reject or not a two-tailed hypothesis test for $P_1 - P_2$.

T **3.** It is possible to test the population proportion for categorical data type.

F **4.** In a hypothesis test, the p-value measures the probability that the alternative hypothesis is true.

1 False (p-value = the smallest level of significance at which H_0 would be rejected) 1

F **5.** A two-tailed hypothesis test is used when the null hypothesis looks like the following: $H_o : \bar{x} = 100$.

1 False ($H_0: \mu = 100$) 1

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Q2. Answer the following questions by choosing the right answer

1. The t-distribution is used in a hypothesis test about the population mean because:

   a. The population standard deviation is unknown and the sample size is small.

   b. It results in a lower probability of a Type I error occurring.

   c. It provides a smaller critical value than the standard normal distribution for a given sample size.

   d. The population standard deviation is known or the sample size is large

   e. None of the above.

2. For testing the following null hypothesis: $H_0: P_1 - P_2 \le 0.05$ the test statistic value given that $n_1 = 265$, $n_2 = 285$, $x_1 = 106$, $x_2 = 57$ equals to:

   a. 0.2964
   b. 3.8490
   c. 2.330
   d. 0.20
   e. 3.9162

$\bar{P}_1 = \frac{106}{265} = 0.4$, $\bar{P}_2 = \frac{57}{285} = 0.2$

$\bar{P} = \frac{106+57}{265+285} = \boxed{0.296}$

$Z_0 = \frac{(0.4-0.2)-0.05}{\sqrt{(0.296)(0.704)\left(\frac{1}{265}+\frac{1}{285}\right)}} = 3.849$

3. A hypothesis test is to be conducted using an alpha = .05 level. This means:

   a. There is a 5 percent chance that the null hypothesis is true.

   b. There is a 5 percent chance that the alternative hypothesis is true.

   c. There is a maximum 5 percent chance that a true null hypothesis will be rejected.

   d. There is a 5 percent chance that a Type II error has been committed.

   e. None of the above.

4. A hypothesis test for the difference between two means is considered a two-tailed test when:

   a. The population variances are equal.
   b. The null hypothesis states that the population means are equal.
   c. The alpha level is 0.10 or higher.
   d. The p-value less than alpha
   e. None of the above.

5. Under what conditions can the t-distribution be correctly employed to test the difference between two population means?

   a. When the samples from the two populations are small and the population variances are unknown.

   b. When the two populations of interest are assumed to be normally distributed.

   c. When the population variances are assumed to be equal.

   d. The selected samples are independent.

   e. All of the above.

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Q3. A telephone company wants to determine whether the demand on a new security system varies between homeowners and renters. Two independent random samples of 25 homeowners and 20 renters were randomly selected. It was found that 10 out of the 25 homeowners and 6 out of the 20 renters would bye the new security system. At 0.02 level of significance, do the data provide sufficient evidence to conclude that the renters are at most as interested as the homeowners in buying the new security system? Use the **p-value** approach.

The hypotheses are: H_0: H_A:
The assumptions are: a. b. See Q5 in form A
The test statistic value:
The p-value =
The decision rule & the decision:
The conclusion:

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Q4. Referring to the previous question, if [0.208 , 0.592] is a 95% CI on the percentage of the homeowners who would bye the new security system, do you think that the number of the homeowners who would by the security system is the same as the number of who wouldn't bye it? Explain in detail.

The hypotheses are: H_0:	H_A:
The decision rule: See Q6 in form A	
The decision:	
The conclusion:	

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Q5. A company manager wishes to compare the effectiveness of two methods for training new sales people. He claims that type A training would increase the weekly sales by more than $50 rather than type B training. To test his claim the he selected 22 sales trainees who were randomly divided equally into two experimental groups – one receives type A and the other type B training. When the he reviewed the performances of the salespeople in the two groups he found the following results:

	A Group	**B Group**
Average Weekly Sales (in $)	1500	1300
Standard Deviation (in $)	225	251

Using 10% level of significance, do you agree with the company manager? Explain.

The hypotheses are: H_0:	H_A:
The assumptions are: a.	b.
c.	d.
The test statistic: See Q3 in form A	
The critical value:	
The decision rule & the decision:	
Conclusion:	

Q6. Referring to the previous question and assuming that the sample of the weekly sales by type B training method has a size of 36, do you think that the average weekly sales by type B training method would different from \$1400? Use the **p-value** approach with 5% level of significance.

The hypotheses are: H_0:	H_A:
The test statistic: See Q4 in form A	
The p-value:	
The decision:	

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