

HW 8 - Math 10

For the following questions, State H_0 and H_a **and** choose the correct model from this list:

- | | |
|--|--|
| a) One population, Z test for mean | e) Z-test: comparing two independent population means |
| b) One population, t test for mean | f) t-test: independent samples, two population pooled variance. |
| c) One population, Z test of proportion | g) t-test: independent samples, two population unequal variance. |
| d) One population, Chi-square test of variance | h) t-test: dependent sampling, matched pairs |

1. You want to support the claim that male bass singers are taller than male tenor singers. 20 singers of each type will be sampled. Assume that the population variances are not equal for these two groups.
2. You want to reject the claim that no more than 10% of students will suffer financial hardship if tuition increased. 400 students will be sampled.
3. An investor wants to reject the claim that the standard deviation for mutual fund portfolios is no more than 10. A total of 31 mutual fund portfolios will be sampled.
4. A study claims people now spend, on average, more time on the Internet than they do watching television. 200 people will be asked how much time they spent on the TV and on the Internet. You want to support this claim.
5. Is there a difference in quality between vegetables bought at farmers markets and vegetables bought at a high end grocer? Test this claim by sampling random vegetables from 20 farmers markets and 20 high end grocers. An F-test shows that population variances are equal for these two groups.
6. A study claims the average age for a community college student is over 27. You want to support this claim and sample 20 students.

7. A community college district compared the number of hours students worked at an outside job at its two colleges. Design and run a test to determine if there is a significant difference in hours worked by students at the 2 colleges. Use a 1% level of significance for this test. Assume population variances are equal.

| <p>(a) (DESIGN) State your Hypothesis</p> | <p>(e) (DATA) Conduct the test and circle your decision</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 15%;"></td> <td style="width: 15%;">College A</td> <td style="width: 15%;">College B</td> <td style="width: 15%;"></td> <td style="width: 15%;"></td> <td style="width: 15%;"></td> </tr> <tr> <td>sample mean</td> <td>25.57</td> <td>13.86</td> <td></td> <td></td> <td></td> </tr> <tr> <td>sample std dev</td> <td>11.90</td> <td>11.19</td> <td></td> <td></td> <td></td> </tr> <tr> <td>sample size</td> <td>14</td> <td>14</td> <td></td> <td></td> <td></td> </tr> </table> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <tr> <th style="width: 60%;">Reported p-values</th> <th>two tail</th> <th>lower tail</th> <th>upper tail</th> </tr> <tr> <td>pooled variance t-test</td> <td>0.012</td> <td>0.006</td> <td>0.994</td> </tr> <tr> <td>unequal variance t-test</td> <td>0.013</td> <td>0.007</td> <td>0.993</td> </tr> <tr> <td>matched pairs t-test</td> <td>0.000</td> <td>0.001</td> <td>0.999</td> </tr> </table> <p style="text-align: center;">Correct p-value _____</p> <p style="text-align: center;">Reject Ho Fail to Reject Ho</p> <p>(f) (CONCLUSION) State your overall conclusion in language that is clear, relates to the original problem and is consistent with your decision.</p> | | College A | College B | | | | sample mean | 25.57 | 13.86 | | | | sample std dev | 11.90 | 11.19 | | | | sample size | 14 | 14 | | | | Reported p-values | two tail | lower tail | upper tail | pooled variance t-test | 0.012 | 0.006 | 0.994 | unequal variance t-test | 0.013 | 0.007 | 0.993 | matched pairs t-test | 0.000 | 0.001 | 0.999 |
|---|---|------------|------------|-----------|--|--|--|--------------------|-------|-------|--|--|--|-----------------------|-------|-------|--|--|--|--------------------|----|----|--|--|--|-------------------|----------|------------|------------|------------------------|-------|-------|-------|-------------------------|-------|-------|-------|----------------------|-------|-------|-------|
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| <p>(b) (DESIGN) State Significance Level of the test and explain Type I error.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>(c) (DESIGN) Determine the statistical model (test statistic) Explain your reasoning.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>(d) (DESIGN) Determine decision rule (p-value method)</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

8. Does the home team have an advantage in NBA basketball games? In a study of 75 games, the visiting team points were compared to the home team points. Design and conduct a hypothesis test with a significance level of 5%

| <p>(a) (DESIGN) State your Hypothesis</p> | <p>(e) (DATA) Conduct the test and circle your decision</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <thead> <tr> <th style="width: 30%;"></th> <th style="width: 15%;">Visiting</th> <th style="width: 15%;">Home</th> <th style="width: 15%;"></th> <th style="width: 15%;"></th> </tr> </thead> <tbody> <tr> <td>sample mean</td> <td>95.47</td> <td>101.31</td> <td></td> <td></td> </tr> <tr> <td>sample std dev</td> <td>12.91</td> <td>12.72</td> <td></td> <td></td> </tr> <tr> <td>sample size</td> <td>75</td> <td>75</td> <td></td> <td></td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;">Reported p-values</th> <th style="width: 10%;">two tail</th> <th style="width: 15%;">lower tail</th> <th style="width: 15%;">upper tail</th> </tr> </thead> <tbody> <tr> <td>F-test for variances</td> <td>0.899</td> <td></td> <td></td> </tr> <tr> <td>pooled variance t-test</td> <td>0.006</td> <td>0.003</td> <td>0.997</td> </tr> <tr> <td>unequal variance t-test</td> <td>0.006</td> <td>0.003</td> <td>0.997</td> </tr> <tr> <td>matched pairs t-test</td> <td>0.000</td> <td>0.000</td> <td>1.000</td> </tr> </tbody> </table> | | Visiting | Home | | | sample mean | 95.47 | 101.31 | | | sample std dev | 12.91 | 12.72 | | | sample size | 75 | 75 | | | Reported p-values | two tail | lower tail | upper tail | F-test for variances | 0.899 | | | pooled variance t-test | 0.006 | 0.003 | 0.997 | unequal variance t-test | 0.006 | 0.003 | 0.997 | matched pairs t-test | 0.000 | 0.000 | 1.000 |
|---|--|------------|------------|------|--|--|-------------|-------|--------|--|--|----------------|-------|-------|--|--|-------------|----|----|--|--|-------------------|----------|------------|------------|----------------------|-------|--|--|------------------------|-------|-------|-------|-------------------------|-------|-------|-------|----------------------|-------|-------|-------|
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| <p>(b) (DESIGN) State Significance Level of the test and explain Type I error.</p> | <p>Correct p-value _____</p> <p style="text-align: center; margin-top: 20px;">Reject Ho Fail to Reject Ho</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>(c) (DESIGN) Determine the statistical model (test statistic) Explain your reasoning.</p> | <p>(f) (CONCLUSION) State your overall conclusion in language that is clear, relates to the original problem and is consistent with your decision.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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9. Do directed reading activities in the classroom help elementary school students improve aspects of their reading ability? A treatment class of 21 third-grade students participated in these activities for eight weeks, and a control class of 23 third-graders followed the same curriculum without the activities. After the eight-week period, students in both classes took a Degree of Reading Power (DRP) test which measures the aspects of reading ability that the treatment is designed to improve. At the 5% level of significance, can you conclude that directed reading activities improved DRP scores?

| <p>(a) (DESIGN) State your Hypothesis</p> | <p>(e) (DATA) Conduct the test and circle your decision</p> <table border="1" style="margin: 10px auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 30%;"></th> <th style="width: 15%;">Treatment</th> <th style="width: 15%;">Control</th> <th style="width: 15%;"></th> <th style="width: 15%;"></th> </tr> </thead> <tbody> <tr> <td>sample mean</td> <td>51.48</td> <td>41.52</td> <td></td> <td></td> </tr> <tr> <td>sample std dev</td> <td>11.01</td> <td>17.15</td> <td></td> <td></td> </tr> <tr> <td>sample size</td> <td>21.00</td> <td>23.00</td> <td></td> <td></td> </tr> </tbody> </table> <table border="1" style="margin: 10px auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 60%;">Reported p-values</th> <th style="width: 10%;">two tail</th> <th style="width: 15%;">lower tail</th> <th style="width: 15%;">upper tail</th> </tr> </thead> <tbody> <tr> <td>F-test for variances</td> <td>0.049</td> <td></td> <td></td> </tr> <tr> <td>pooled variance t-test</td> <td>0.029</td> <td>0.985</td> <td>0.015</td> </tr> <tr> <td>unequal variance t-test</td> <td>0.034</td> <td>0.983</td> <td>0.017</td> </tr> <tr> <td>matched pairs t-test</td> <td>n/a</td> <td>n/a</td> <td>n/a</td> </tr> </tbody> </table> <p style="text-align: center;">Correct p-value _____</p> <p style="text-align: center;">Reject Ho Fail to Reject Ho</p> | | Treatment | Control | | | sample mean | 51.48 | 41.52 | | | sample std dev | 11.01 | 17.15 | | | sample size | 21.00 | 23.00 | | | Reported p-values | two tail | lower tail | upper tail | F-test for variances | 0.049 | | | pooled variance t-test | 0.029 | 0.985 | 0.015 | unequal variance t-test | 0.034 | 0.983 | 0.017 | matched pairs t-test | n/a | n/a | n/a |
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