

HW 9 - Math 10 Answers

1. 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%

(a) (DESIGN) State your Hypothesis

$H_0: \mu_d \geq 0 \quad H_a: \mu_d < 0$

d= visitor score-home score

(b) (DESIGN) State Significance Level of the test and explain Type I error.

$\alpha = .05$, the maximum probability of Type I error: we would incorrectly claim that home team scores more points on average than the visiting team.

(c) (DESIGN) Determine the statistical model (test statistic) Explain your reasoning.

Model: Matched Paired t-test. This model is appropriate because there is dependent sampling.

(d) (DESIGN) Determine decision rule (p-value method)

Reject H_0 if p-value < alpha.

(e) (DATA) Conduct the test and **circle** your decision

	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

Correct p-value **0.000**

Reject H_0

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

Home teams have an advantage - they do score more points on average than visiting teams.

2. 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>$H_0: \mu_1 \leq \mu_2 \quad H_a: \mu_1 > \mu_2$</p>	<p>(e) (DATA) Conduct the test and circle your decision</p> <table border="1"> <thead> <tr> <th></th> <th>Treatment</th> <th>Control</th> </tr> </thead> <tbody> <tr> <td>sample mean</td> <td>51.48</td> <td>41.52</td> </tr> <tr> <td>sample std dev</td> <td>11.01</td> <td>17.15</td> </tr> <tr> <td>sample size</td> <td>21.00</td> <td>23.00</td> </tr> </tbody> </table>		Treatment	Control	sample mean	51.48	41.52	sample std dev	11.01	17.15	sample size	21.00	23.00								
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<p>(b) (DESIGN) State Significance Level of the test and explain Type I error.</p> <p>$\alpha = .05$, the maximum probability of Type I error: we would incorrectly claim that directed reading activities improved DRP scores.</p>	<table border="1"> <thead> <tr> <th>Reported p-values</th> <th>two tail</th> <th>lower tail</th> <th>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>	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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<p>(c) (DESIGN) Determine the statistical model (test statistic) Explain your reasoning.</p> <p>Model: Unequal variance t-test. This model is appropriate because there is independent sampling and there is a significant difference between the population variances (F-test pvalue=0.049)</p>	<p>Correct p-value 0.017</p> <p>Reject Ho</p>																				
<p>(d) (DESIGN) Determine decision rule (pvalue method)</p> <p>Reject Ho if p-value < alpha.</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> <p>Directed reading activities in the classroom improved DRP scores, helping elementary school students improve aspects of their reading ability.</p>																				