

Name: Key

Date: _____

Class: _____

Comparing Two Samples Practice

1. Researchers have hypothesized that female Downy Woodpeckers avoid the feeding areas of socially dominant males; that is, the males chose them away from prime spots. An alternative opinion is that there are important physical characteristics of males and females that might lead them to choose different foraging locations. One such characteristic is the bill length of the males and females; it may be that longer bills let woodpeckers drill deeper into a tree and thus get more food per tree. The researchers believe that the bill lengths of males may be longer from the bill lengths of females.

Bill Lengths (cm)	
Male	Female
2.01	1.78
1.84	1.76
1.86	1.74
1.91	1.82
1.75	1.87
1.79	1.84
1.88	1.82
2.05	1.87
1.85	1.93
1.90	1.76
1.94	1.96
1.86	1.86

The data in the table are the bill lengths of 12 male and 12 female randomly selected Downy Woodpeckers caught and released in a banding survey. Determine if there is sufficient evidence to conclude that there is a difference in mean bill length for males and females.

State: Set up hypotheses and identify statistical data

H_a: $\mu_{males} = \mu_{females}$
H₀: $\mu_{males} > \mu_{females}$

- Plan: Select the appropriate and consider conditions. Test type: 2 sample t
- Do: Compute the statistic.

P-value = 0.054 t-score = 1.67

Reject the null / Fail to Reject the null

With a p value of 0.054 at the 5 % significance level we (don't have/have) sufficient evidence to reject the null hypothesis and (can/cannot) conclude that the mean bill length of males is greater than females.
(insert alternative hypothesis in context here)

2. A college football coach was interested in whether the college's strength development class increased his players' maximum lift (in pounds) on the bench press exercise. He asked 4 of his players to participate in a study. The amount of weight they could each lift was recorded before they took the strength development class. After completing the class, the amount of weight they could each lift was again measured. The data are as follows:

Weight (in pounds)	Player 1	Player 2	Player 3	Player 4
Amount of weight lifted prior to the class	205	241	338	368
Amount of weight lifted after the class	295	252	330	360

The coach wants to know if the strength development class makes his players stronger, on average.

Hybart | 1

State: Set up hypotheses and identify statistical data
H_a: $\mu_{before} = \mu_{after}$
H₀: $\mu_{before} < \mu_{after}$

- Plan: Select the appropriate and consider conditions. Test type: 2 sample t
- Do: Compute the statistic.

P-value = 0.33 t-score = -0.47

Reject the null / Fail to Reject the null

With a p value of 0.33 at the 5 % significance level we (don't have/have) sufficient evidence to reject the null hypothesis and (can/cannot) conclude that the avg weight lifted was greater after the class.

3. A math teacher for Math 4753 wants to determine if a new book proposed for the course is better than the old book that was used before. The math teacher decides that the two classes might have different math ability coming into the course. He gives a test at the beginning of the semester to measure the math ability the students have when they come into the course. He uses this test to create a matched pair design for 30 students from each class.

Perform a hypothesis test with a percent level of significance for the matched pairs design in Problem 8 to see if the scores for the new book are higher than those for the old book. The scores he gets are as follows:

State: Set up hypotheses and identify statistical data

H_a: $\mu_{new} = \mu_{old}$
H₀: $\mu_{new} > \mu_{old}$

- Plan: Select the appropriate and consider conditions. Test type: 2 sample t
- Do: Compute the statistic.

P-value = 0.529 t-score = -0.07

Reject the null / Fail to Reject the null

With a p value of 0.53 at the 5 % significance level we (don't have/have) sufficient evidence to reject the null hypothesis and

New Book	Old Book
96	97
95	94
94	94
92	95
92	90
90	91
90	90
89	85
88	87
88	92
86	85
86	81
84	89
84	83
84	85
83	72
83	80
81	89
79	76
78	78
77	75
77	76
72	74
70	81
68	71
67	66
65	65
64	68
62	65
62	58

Hybart | 2

(can/cannot) conclude that the avg score from book was higher than old book.

4. Mr. H. compares his awesomeness on 2 separate weeks. He wanted to know if his first week differed significantly from the second because of his exhaustion. He asked his students to rate him at the end of each day. Below are the scores from each day for the 2 weeks. Use a hypothesis test to determine if there is a difference with a 10% level of significance.

	Mon	Tues	Wed	Thur	Fri
Week 1	89	78	90	68	75
Week 2	85	70	92	70	73

State: Set up hypotheses and identify statistical data

H₀: $\mu_1 = \mu_2$

H_a: $\mu_1 \neq \mu_2$

- Plan: Select the appropriate and consider conditions. Test type: 2 sample t
- Do: Compute the statistic.

P-value = 0.83 t-score = 0.22

- Conclude: Reject the null / Fail to Reject the null

With a p value of 0.83 at the 10 % significance level we (don't have / have) sufficient evidence to reject the null hypothesis and (can/cannot) conclude that the avg score from book was higher than old book.
exhaustion level is different
 (insert alternative hypothesis in context here)