Lesson 13: Inference for Two Means (Independent Samples)

Preparation

Solutions

<table>
<tr><th>Problem</th><th>Part</th><th>Solution</th></tr>
<tr><td>1</td><td>-</td><td>There is no pairing between the two groups. Group 1 does not determine Group 2.
<table>
<tr><th>Name of Hypothesis Test</th><th>Requirements for test</th><th>Name of Distribution from which the test statistic is computed</th><th>Null Hypothesis and Possible Alternative Hypotheses</th></tr>
<tr><td>Hypothesis test for one mean—sigma known</td><td>Data are a simple random sample from the population.

The distribution of sample means is normal.</td><td>Normal distribution</td><td>$H_0: \mu = \mu_0$

$H_a: \mu < \mu_0$
$H_a: \mu > \mu_0$
$H_a: \mu \neq \mu_0$</td></tr>
<tr><td>Hypothesis test for one mean – sigma unknown</td><td>Data are a simple random sample from the population.

The distribution of sample means is normal.</td><td>T-Distribution</td><td>$H_0: \mu = \mu_0$

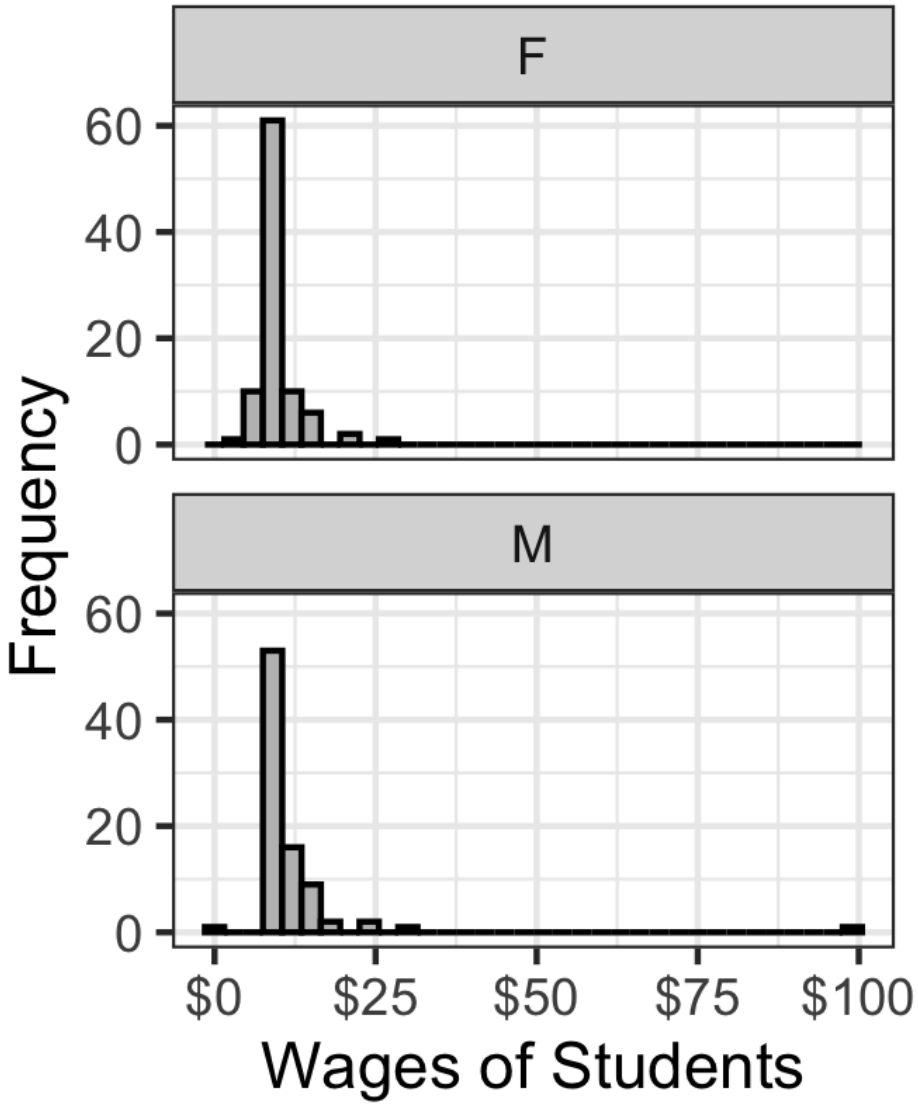
$H_a: \mu < \mu_0$
$H_a: \mu > \mu_0$
$H_a: \mu \neq \mu_0$</td></tr>
<tr><td>Hypothesis test for two means – paired data</td><td>Data are a simple random sample from the population.

The distribution of the differences means is normal.</td><td>T-Distribution</td><td>$H_o: \mu_d = 0$

$H_a: \mu_d \neq 0$
$H_a: \mu_d < 0$
$H_a: \mu_d > 0$</td></tr>
<tr><td>Hypothesis test for two means – independent samples</td><td>Data are a simple random sample from the population.
The distribution of sample means from each group is normal.</td><td>T-Distribution</td><td>$H_o: \mu_1 = \mu_2$

$H_a: \mu_1 \neq \mu_2$
$H_a: \mu_1 < \mu_2$
$H_a: \mu_1 > \mu_2$</td></tr>
</table>
</td></tr>
<tr><td>2</td><td>-</td><td></td></tr>
<tr><td>3</td><td>A</td><td>Is there a difference between the mean wages of BYU-Idaho male students and female students?</td></tr>
<tr><td>3</td><td>B</td><td>$H_o : \mu_1 = \mu_2$
$H_a : \mu_1 \neq \mu_2$</td></tr>
<tr><td>4</td><td>-</td><td>Students from one of the Math Department professor's classes took a survey which asked how much they make as an hourly wage.</td></tr>
</table>

Problem	Part	Solution
5	-	-Males: $\bar{x} = 11.935$, $s = 10.491$, $n = 85$ - Females: $\bar{x} = 9.759$, $s = 3.169$, $n = 91$ - You should also include two histograms here, one for the men and one for the women.
6	A	Independent Samples Hypothesis test
6	B	-The sample size is large for each sample so we can assume normality. - It was not a simple random sample.
6	C	$t = \pm 1.836$
6	D	$df = 98.263$
6	E	P-value $= 0.069$, $\alpha = 0.05$, p-value $> \alpha$
6	F	fail to reject the null hypothesis
6	G	We have insufficient evidence to say that there is a difference between wages of male and female BYU-Idaho students.
6	H	(-0.176, 4.529) or (-4.529, 0.176)



Problem	Part	Solution
6	I	-We are 95% confident that the true difference in mean wages between women and men at BYU-Idaho is somewhere between \$-0.18 and \$4.53, or \$-4.53 and \$0.18. - We can also see that there is insufficient evidence using the confidence interval method because zero is included in our confidence interval.
7		Answers may vary