

Final Review – Part 3: Hypothesis Tests

Basics

- A hypothesis test problem will ask you to test a claim.
- Look for a significance level, not a confidence level.
- Use the 5 step process.
 1. State H_0 & H_1 .
 2. State the level of significance α .
 3. State which test you are performing.
 4. State the calculated value of the test statistic and P-value from StatCrunch.
 5. Make a decision about H_0 . (Reject H_0 or Fail to Reject H_0)
Make a conclusion about H_1 . (There {is/is not} sufficient evidence to conclude that “ H_1 is true”.)

Hypothesis Test for a Proportion

- The wording should indicate that we are testing a claim about a proportion or percentage.
- The claim should compare the proportion/percentage to a particular number, not another group.
- The sample information provided will be one set of x out of n .
- The data gathered would be categorical, not numerical.
- No standard deviation will be provided.
- StatCrunch steps:
Stat > Proportions > 1-sample > With Summary
Enter x for the number of successes, and n for the number of observations.
Enter the correct value in the null hypothesis and the correct sign in the alternative hypothesis.
Press compute! to find the test statistic and P-value.

Hypothesis Test for Estimating a Mean

- The wording should indicate that we are testing a claim about a mean.
- The claim should compare the mean to a particular number, not another group.
- The sample information provided will either be one set of sample mean/sample standard deviation/ n or one set of numerical data.
- The data gathered would be numerical, not categorical.
- StatCrunch steps:
Given mean/s.d./n
Stat > T-statistics > 1-sample > With Summary
Enter sample mean, standard deviation, size.
Enter the correct value in the null hypothesis and the correct sign in the alternative hypothesis.
Press compute! to find the test statistic and P-value.
Given data

Type data in one column.

Stat > T-statistics > 1-sample > With Data

Enter the correct value in the null hypothesis and the correct sign in the alternative hypothesis.

Press compute! to find the test statistic and P-value.

Examples

1) A random sample of 8 students was asked how much they spent on books and supplies this semester.

\$255 \$325 \$400 \$190 \$300 \$300 \$315 \$280

Using the 0.05 level of significance, test the claim that the mean amount spent by all college students is less than \$350 this semester.

“Test the claim that ...” & “0.05 level of significance” → Hypothesis Test Problem

Mean is mentioned in the problem, the data provided are numerical → Hypothesis Test for Mean

ANSWER:

1. $H_0: \mu = 5$

$H_1: \mu > 5$

2. $\alpha = 0.05$

3. One Mean Test

4. $t = -2.56$, P-value = 0.0187

5. Reject H_0 .

There is sufficient evidence to conclude that the mean amount spent by all college students is less than \$350 this semester.

2) A random sample of 500 college students showed that 121 of them owned an iPhone. At the 0.05 level of significance, test the claim that less than 30% of all college students own an iPhone.

"Test the claim that ..." & "0.05 level of significance" → Hypothesis Test Problem

Proportion is mentioned in the problem, sample information is 121 out of 500, the data (iPhone or No iPhone) would be categorical, no numerical data or standard deviation provided → Hypothesis Test for Proportion

Number of Successes: 121

Number of Observations: 500

ANSWER:

1. $H_0: p = 0.3$

$H_1: p < 0.3$

2. $\alpha = 0.05$

3. One Proportion Test

4. $z = -2.83$, P-value = 0.0023

5. Reject H_0 .

There is sufficient evidence to conclude that less than 30% of all college students own an iPhone.

3) A random sample of 45 salmon filets had their weights (in ounces) measured. The sample mean was 20.3 ounces, with a standard deviation of 2.3 ounces. At the 0.05 level of significance, test the claim that the mean weight of all salmon fillets is 19 ounces.

“Test the claim that ...” & “0.05 level of significance” → Hypothesis Test Problem

Mean is mentioned in the problem, the data (weights) would be numerical, sample mean and standard deviation provided → Hypothesis Test for Mean

Sample Mean: 20.3, Sample Standard Deviation: 2.3, Sample Size: 45

ANSWER:

1. $H_0: \mu = 20$

$H_1: \mu \neq 20$

2. $\alpha = 0.05$

3. One Mean Test

4. $t = 0.87$, P-value = 0.3863

5. Fail to Reject H_0 .

There is NOT sufficient evidence to conclude that the mean weight of all salmon fillets is different than ounces.