

Econ 140 - Spring 2016

Section 3

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February 4, 2016

1 Basic Concepts of Hypothesis Testing

Exercise 1.1. Suppose that you would like to investigate whether there is gender discrimination among workers in the US. (a) State the null and alternative hypothesis. (b) Describe the Type I and Type II errors.

2 Two-Sided Hypothesis Tests

Exercise 2.1. (Adapted from Stock & Watson, Exercise 3.13.) Data on fifth-grade test scores (reading and mathematics) for 420 school districts in California yield $\bar{Y} = 646.2$ and standard deviation $s_Y = 19.5$.

(a) At the 5% significance level, can we reject the hypothesis that the mean test score in the population is 650? Carry out the test using a t -statistic.

(b) Carry out the same test as in part (a) but using a p -value.

- (c) Without doing any calculation, is 650 contained in the 95% confidence interval for the population mean test score? Explain why or why not.
- (d) Calculate the 95% confidence interval for the mean test score in the population, and verify your answer in part (c).

When districts were divided into districts with small classes (< 20 students per teacher) and large classes (≥ 20 students per teacher), the following results were found:

| Class Size | Ave. Score | Standard Deviation | n |
|------------|------------|--------------------|-----|
| Small | 657.4 | 19.4 | 238 |
| Large | 650.0 | 17.9 | 182 |

- (e) At the 10% significance level, can we reject the null hypothesis that the mean test scores across the two groups is equal? (For practice, solve this problem using t-statistic, p-value, and confidence interval).