

Section 10.1: 1--21 odd

Section 10.2: 15, 17, 19, 21, 29, 31

Announcements:

- **Test #7 will take place on Monday, May 12. It will cover Chapter 9. A cheat sheet (1/4 the size of letter size paper, double-sided) is allowed. Bring a calculator.**
 - **Tentatively there will be no class meeting on Thursday, May 15 (i.e. the Thursday the week before the final exam) as I will be undergoing another medical procedure.**
 - **Final exam will take place on Monday, May 19, 10:00—11:40 am. It will be open book, open notes, and comprehensive in coverage, though emphasis will be given to more recent material. Review will be provided next week.**
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Handout on Hypothesis Tests

Null Hypothesis (H_0): Assumed true until proven otherwise.

Alternative Hypothesis (H_1): What you try to find evidence for.

(Hypothesis testing on population mean μ of a continuous quantity as a example.

Replace μ by p for proportion problems.)

two-tailed	left-tailed	right-tailed
$H_0: \mu = \square$	$H_0: \mu = \square$	$H_0: \mu = \square$
$H_1: \mu \neq \square$	$H_1: \mu < \square$	$H_1: \mu > \square$

Example: Formulate the null hypothesis and the alternative hypothesis for each problem:

(A) An energy official claims that the oil output per well in the U.S. has changed from the 1998 level of 11.1 barrels per day.

(B) An energy official claims that the oil output per well in the U.S. has declined from the 1998 level of 11.1 barrels per day.

(C) According to CDCP, 16% of children aged 6 to 11 years are overweight. A researcher thinks that the percentage is higher than this CDCP figure.

Main Ideas in Hypothesis Testing on population mean μ , assuming σ known:

- Agree on a pre-determined “Level of Significance”, denoted by α (usually 0.05).
- Gather a sample of size n , find $\bar{x}$.
- Calculate the Z score $z_0 = \frac{\bar{x} - \mu_0}{\sigma / \sqrt{n}}$ and determine the corresponding “ P -value” (of seeing a Z score “at least as extreme as” this value z_0).
- Compare the P -value with α and draw a conclusion.

If P -value is small enough: Reject the null hypothesis H_0 . Thus state:

“There is sufficient evidence at the significance level α to support H_1 .”

If P -value is not small enough: Fail to reject the null hypothesis H_0 . Thus state:

“There is not sufficient evidence at the significance level α to support H_1 .”

two-tailed	left-tailed	right-tailed
$H_0: \mu = \square$ $H_1: \mu \neq \square$	$H_0: \mu = \square$ $H_1: \mu < \square$	$H_0: \mu = \square$ $H_1: \mu > \square$
P -value = $P(Z < z_0 \text{ or } Z > z_0)$	P -value = $P(Z < z_0)$	P -value = $P(Z > z_0)$

Example: Do each hypothesis test:

(A) An energy official claims that the oil output per well in the U.S. has changed from the 1998 level of 11.1 barrels per day. He randomly samples 35 wells and finds their mean output to be 10.4 barrels per day. Assume that $\sigma = 2.3$ barrels per day. Test the research’s claim at $\alpha = 0.05$ level of significance.

(B) An energy official claims that the oil output per well in the U.S. has declined from the 1998 level of 11.1 barrels per day. He randomly samples 35 wells and finds their mean output to be 10.4 barrels per day. Assume that $\sigma = 2.3$ barrels per day. Test the research’s claim at $\alpha = 0.05$ level of significance.