

1. The z-score from a sample of 25 observations for the two-sided test of

$$H_0: \mu = 64.$$

$$H_a: \mu < 64.$$

has the value $z = -1.84$.

- (a) Find the P -value. What conclusion would you draw at the 5% significance level?

$$.0329$$

Reject the null hypothesis. There is strong evidence to suggest that the population mean is less than 64.

- (b) Redo part (a) using an alternative hypothesis of $H_a: \mu \neq 64$.

$$2(.0329) = .0658$$

Fail to reject the null hypothesis. There is not strong evidence to suggest that the population mean is not 64.

For questions #2-3, carry out a complete hypothesis test using the four-step process.

2. When working properly, a soda machine will dispense soda into cans Normally with a mean of $\mu = 12$ ounces. A quality control engineer is concerned that the machine is under filling the cans. He draws a random sample of 8 cans and records the following amounts:

12.12 11.35 11.51 11.86 11.75 11.45 11.92 12.22

- 1) $\mu =$ mean amount of soda dispensed into all cans filled by this machine.

$$H_0: \mu = 12 \text{ ounces}$$

$$H_a: \mu < 12 \text{ ounces}$$

Left-tailed

$$2) \bar{x} = 11.7725, s = .3168, n = 8$$

$$3) z = \frac{11.7725 - 12}{.3168/\sqrt{8}} = -2.03 \xrightarrow{\text{Table}} .0212 = P\text{-value}$$

- 4) Because the P -value is significant, reject the null hypothesis. There is strong evidence to suggest the machine is under filling the cans.

3. A hospital nurse is conducting a study about sleeping habits of four-year-olds. She wonders if they get more sleep than the recommended 8 hours per night. To test her claim, she collects a simple random sample of 12 four-year-olds and asks their parents how much sleep they got last night. Suppose the distribution of the amount of sleep for all four-year-olds is approximately Normal. The results are given below.

Child	Hrs of sleep
1	9.25
2	8.25
3	6.50
4	8.50
5	7.50
6	9.25
7	9.00
8	8.00
9	8.25
10	9.75
11	10.00
12	9.25

- 1) μ = mean amount of sleep for all four-year-olds
 $H_0: \mu = 8$ hours
 $H_a: \mu > 8$ hours Right-tailed
- 2) $\bar{x} = 8.625$, $s = .9972$, $n = 12$
- 3) $z = \frac{8.625 - 8}{.9972/\sqrt{12}} = 2.17$ Table $\rightarrow 1 - .9850 = .0150$
- 4) Because the P-value is significant, reject the null hypothesis.
There is strong evidence to suggest that four-year-olds get more sleep than the recommended 8 hours per night, on average.