

7.10: Chapter 7 Solutions

1. The random variable is the mean Internet speed in Megabits per second.
3. The random variable is the mean number of children an American family has.
5. The random variable is the proportion of people picked at random in Times Square visiting the city.
7.
 1. $H_0 : P \geq 0.42$
 2. $H_a : P < 0.42$
9.
 1. $H_0 : \mu = 15$
 2. $H_a : \mu \neq 15$
11.

Type I: The mean price of mid-sized cars is \$32,000, but we conclude that it is not \$32,000.

Type II: The mean price of mid-sized cars is not \$32,000, but we conclude that it is \$32,000.
13.

α = the probability that you think the bag cannot withstand -15 degrees F, when in fact it can

β = the probability that you think the bag can withstand -15 degrees F, when in fact it cannot
15.

Type I: The procedure will go well, but the doctors think it will not.

Type II: The procedure will not go well, but the doctors think it will.
17. 0.019
19. 0.998
21. A normal distribution or a Student's t -distribution
23. Use a Student's t -distribution
25. a normal distribution for a single population mean
27. It must be approximately normally distributed.
29. This is a left-tailed test.
31. This is a two-tailed test.
- 33.

Figure 7.10.1

35. a right-tailed test
37. a left-tailed test
39. This is a left-tailed test.
41. This is a two-tailed test.
42.
 1. $H_0 : \mu = 34; H_a : \mu \neq 34$
 2. $H_0 : P \leq 0.60; H_a : P > 0.60$
 3. $H_0 : \mu \geq 100,000; H_a : \mu < 100,000$
 4. $H_0 : P = 0.29; H_a : P \neq 0.29$
 5. $H_0 : P \geq 0.05; H_a : P < 0.05$

6. $H_0 : \mu \leq 10; H_a : \mu > 10$
7. $H_0 : P = 0.50; H_a : P \neq 0.50$
8. $H_0 : \mu = 6; H_a : \mu \neq 6$
9. $H_0 : P \geq 0.11; H_a : P < 0.11$
10. $H_0 : \mu \leq 20,000; H_a : \mu > 20,000$

43. c

45.

1. Type I error: We conclude that the mean is not 34 years, when it really is 34 years. Type II error: We conclude that the mean is 34 years, when in fact it really is not 34 years.
2. Type I error: We conclude that more than 60% of Americans vote in presidential elections, when the actual percentage is at most 60%. Type II error: We conclude that at most 60% of Americans vote in presidential elections when, in fact, more than 60% do.
3. Type I error: We conclude that the mean starting salary is less than \$100,000, when it really is at least \$100,000. Type II error: We conclude that the mean starting salary is at least \$100,000 when, in fact, it is less than \$100,000.
4. Type I error: We conclude that the proportion of high school seniors who get drunk each month is not 29%, when it really is 29%. Type II error: We conclude that the proportion of high school seniors who get drunk each month is 29% when, in fact, it is not 29%.
5. Type I error: We conclude that fewer than 5% of adults ride the bus to work in Los Angeles, when the percentage that do is really 5% or more. Type II error: We conclude that 5% or more adults ride the bus to work in Los Angeles when, in fact, fewer than 5% do.
6. Type I error: We conclude that the mean number of cars a person owns in his or her lifetime is more than 10, when in reality it is not more than 10. Type II error: We conclude that the mean number of cars a person owns in his or her lifetime is not more than 10 when, in fact, it is more than 10.
7. Type I error: We conclude that the proportion of Americans who prefer to live away from cities is not about half, though the actual proportion is about half. Type II error: We conclude that the proportion of Americans who prefer to live away from cities is half when, in fact, it is not half.
8. Type I error: We conclude that the duration of paid vacations each year for Europeans is not six weeks, when in fact it is six weeks. Type II error: We conclude that the duration of paid vacations each year for Europeans is six weeks when, in fact, it is not.
9. Type I error: We conclude that the proportion is less than 11%, when it is really at least 11%. Type II error: We conclude that the proportion of women who develop breast cancer is at least 11%, when in fact it is less than 11%.
10. Type I error: We conclude that the average tuition cost at private universities is more than \$20,000, though in reality it is at most \$20,000. Type II error: We conclude that the average tuition cost at private universities is at most \$20,000 when, in fact, it is more than \$20,000.

47. b

49. d

51. d

52.

$$H_0 : \mu \geq 50,000$$

$$H_a : \mu < 50,000$$

\bar{x} = the average lifespan of a brand of tires.

[43, 537, 49, 463]

Decision: Reject the null hypothesis.

Conclusion: There is sufficient evidence to conclude that the mean lifespan of the tires is less than 50,000 miles.

54.

$$H_0 : \mu = \$1.00$$

$$H_a : \mu \neq \$1.00$$

\bar{x} = the average cost of a daily newspaper.

[\$0.84, \$1.06]

Decision: Do not reject the null hypothesis.

Conclusion: There is sufficient evidence to support the claim that the mean cost of daily papers is \$1. The mean cost could be \$1.

56.

$$H_0 : \mu = 10$$

$$H_a : \mu \neq 10$$

\bar{x} = the mean number of sick days an employee takes per year.

[4.9443, 11.806]

Decision: Do not reject the null hypothesis.

Conclusion: At the 5% significance level, there is insufficient evidence to conclude that the mean number of sick days is not ten.

60.

$$H_0 : \mu = 4$$

$$H_a : \mu \neq 4$$

\bar{x} = the average I.Q. of a set of brown trout.

[3.8865, 5.9468]

Decision: Reject the null hypothesis.

Conclusion: There is insufficient evidence to conclude that the average IQ of brown trout is not four.

67.

$$H_0 : \mu \leq 69,110$$

$$H_a : \mu > 69,110$$

\bar{x} = the mean salary in dollars for California registered nurses.

[\$68,757, \$73,485]

Decision: Reject the null hypothesis.

Conclusion: At the 5% significance level, there is sufficient evidence to conclude that the mean salary of California registered nurses exceeds \$69,110.

69. c

71.

$$H_0 : P = 0.488$$

$$H_a : P \neq 0.488$$

Decision: Reject the null hypothesis.

Conclusion: At the 5% level of significance, there is enough evidence to conclude that 48.8% of families own stocks. The survey does not appear to be accurate.

73.

$$H_0 : P = 0.517$$

$$H_a : P \neq 0.517$$

Decision: Do not reject the null hypothesis.

Conclusion: At the 5% significance level, there is not enough evidence to conclude that the proportion of homes in Kentucky that are heated by natural gas is 0.517.

However, we cannot generalize this result to the entire nation. First, the sample's population is only the state of Kentucky. Second, it is reasonable to assume that homes in the extreme north and south will have extreme high usage and low usage, respectively. We would need to expand our sample base to include these possibilities if we wanted to generalize this claim to the entire nation.

75.

$$H_0 : \mu \geq 11.52$$

$$H_a : \mu < 11.52$$

Decision: Reject the null hypothesis.

Conclusion: At the 5% significance level, there is enough evidence to conclude that the mean amount of summer rain in the northeaster US is less than 11.52 inches, on average.

We would make the same conclusion if alpha was 1% because the p -value is almost 0.

77.

$$H_0 : \mu \leq 5.8$$

$$H_a : \mu > 5.8$$

Decision: Do not reject the null hypothesis.

Conclusion: At the 5% level of significance, there is not enough evidence to conclude that a woman visits her doctor, on average, more than 5.8 times a year.

79.

$$H_0 : \mu \geq 150$$

$$H_a : \mu < 150$$

Decision: Do not reject the null hypothesis.

Conclusion: At the 1% significance level, there is not enough evidence to conclude that freshmen students study less than 2.5 hours per day, on average. The student academic group's claim appears to be correct.

7.10: Chapter 7 Solutions is shared under a [not declared](#) license and was authored, remixed, and/or curated by LibreTexts.