

- 1) To construct a large-sample confidence interval for a population mean, which assumption below is necessary?
 - a) random sample from the population
 - b) normally distributed population
- 2) A random sample of 75 Burger-Buddy hamburgers has a mean weight of 3.96 ounces and a standard deviation of .085 ounces. Construct a 95% confidence interval for the mean weight of Burger-buddy hamburgers.
- 3) To construct a large-sample confidence interval for a population mean, what z value is used for a confidence level of 94%?
- 4) In a random sample of 250 Jollyville voters, 76 support an increased sales tax to fund mass transit. Construct a 90% confidence interval for the proportion of Jollyville voters who support an increased sales tax to fund mass transit.
- 5) An experimental vaccine is tested on 500 randomly selected adults and it produces side-effects in 12% of these adults. Construct a 98% confidence interval for the proportion of adults who would suffer side-effects from this vaccine.
- 6) If Wonder-Weiner wants to estimate the mean weight of its hotdogs to within .015 ounces of the true value, with 95% confidence, what is the minimum number of hotdogs that must be sampled and weighed? (assume the standard deviation is .08 ounces)
- 7) Suppose that we want to estimate the proportion of voters who approve of their U.S. congressional representative's job performance to within an error of 4%, with 90% confidence. What is the minimum sample size needed if ...
 - a) we believe the proportion is near 65%?
 - b) we have no estimate of the proportion or if we want to use the most conservatively large sample size?

For problems 8 to 12, do the following:

- a) Perform each hypothesis test by both approaches (rejection region and p-value)
 - b) If an error was made, state (in the context of the problem) which type it would have been.
- 8) Hungry-Dude frozen dinners claim that the mean fat content of its frozen turkey dinners is 25 grams. However, a nutritionist believes the mean fat content is greater than advertised. In response, 60 Hungry-Dude frozen turkey dinners are randomly sampled and analyzed. The sampled dinners have a mean fat content of 26.17 grams and a standard deviation of 1.23 grams. Does the sample provide sufficient evidence to conclude that the mean fat content of Hungry-Dude frozen turkey dinners is greater than 25 grams? (Test using $\alpha = .10$)
 - 9) Bozo-Burgers, a fast-food restaurant, claims that the mean waiting time for their drive through orders is less than the 60 second average of its competition. To test their claim, 100 orders are examined (with randomness in terms of items ordered, location, time of day, etc.) and these orders show a mean waiting time of 57.8 seconds and a standard deviation of 14.5 seconds. Does the sample provide sufficient evidence to conclude that the mean waiting time for drive through orders at Bozo-Burgers is less than 60 seconds?
(Test using $\alpha = .05$)
 - 10) A high-fiber breakfast cereal, Honey-Frosted Tree Bark, is advertised to contain 15 grams of dietary fiber per serving. From randomly selected boxes, 50 servings are examined and they have a mean of 14.93 grams of dietary fiber and a standard deviation of .23 grams. Does the sample provide sufficient evidence to conclude that the mean dietary fiber content of a serving of Honey-Frosted Tree bark is different than advertised? (Test using $\alpha = .10$)
 - 11) Past data indicates that 40% of U.S. adults eat breakfast every day. In a recent random sample of 250 adults, 42% say they eat breakfast every day. Does the sample provide sufficient evidence to conclude that the proportion of U.S. adults that eat breakfast every day is now higher than 40%? (Test using $\alpha = .01$)
 - 12) In the year 2000 census, 12.5% of a state's residents were senior citizens. In a random sample of 400 current residents of the state, 64 are senior citizens. Does the sample provide sufficient evidence to conclude that the proportion of the state's residents who are senior citizens has changed? (Test using $\alpha = .10$)

1) a 2) (3.941, 3.979) 3) $z=1.88$ 4) (.256, .352) 5) (.086, .154) 6) $n=110$ 7) a) $n=385$ b) $n=423$

8) $H_0: \mu = 25$ $H_a: \mu > 25$

T.S.: $z = 7.37$

R.R.: $z > 1.28$

Decision: Reject H_0

Conclusion: There is sufficient evidence to conclude that the mean fat content of Hungry-Dude frozen turkey dinners is greater than 25 grams.

p-value is approximately zero (which is less than α), so reject H_0

If an error, Type I

Concluding that the mean fat content of the dinners is greater than 25 grams when in fact it is not greater.

9) $H_0: \mu = 60$ $H_a: \mu < 60$

T.S.: $z = -1.52$

R.R.: $z < -1.645$

Decision: Do not reject H_0

Conclusion: There is not sufficient evidence to conclude that the mean waiting time for drive through orders at Bozo-Burgers is less than 60 seconds.

p-value = .0643 (which is not less than α), so do not reject H_0

If an error, Type II

Not concluding that the mean waiting time for drive through orders is less than 60 seconds when in fact it is less than 60 seconds.

10) $H_0: \mu = 15$ $H_a: \mu \neq 15$

T.S.: $z = -2.15$

R.R.: $z < -1.645$ or $z > 1.645$

Decision: reject H_0

Conclusion: There is sufficient evidence to conclude that the mean dietary fiber content of a serving of Honey-Frosted Tree Bark is different than 15 grams.

p-value = .0316 (which is less than α), so reject H_0

If an error, Type I

Concluding that the mean dietary fiber content of a serving of the cereal is different than 15 grams when in fact it is not different.

11) $H_0: p = .40$ $H_a: p > .40$

T.S.: $z = .65$

R.R.: $z > 2.33$

Decision: Do not reject H_0

Conclusion: There is not sufficient evidence to conclude that the proportion of U.S. adults who eat breakfast every day is now higher than 40%.

p-value = .2578 (which is not less than α), so do not reject H_0

If an error, Type II Not concluding that the proportion of U.S. adults who eat breakfast every day is now higher than 40% when in fact it is higher.

12) $H_0: p = .125$ $H_a: p \neq .125$

T.S.: $z = 2.12$

R.R.: $z < -1.645$ or $z > 1.645$

Decision: reject H_0

Conclusion: There is sufficient evidence to conclude that the proportion of the state's residents who are senior citizens has changed.

p-value = .034 (which is less than α), so reject H_0

If an error, Type I

Concluding that the proportion of the state's residents who are senior citizens has changed when in fact it has not changed.