

## 9.2.1: Null and Alternative Hypotheses (Exercises)

### ? Exercise 9.2.1.5

You are testing that the mean speed of your cable Internet connection is more than three Megabits per second. What is the random variable? Describe in words.

**Answer**

The random variable is the mean Internet speed in Megabits per second.

### ? Exercise 9.2.1.1

You are testing that the mean speed of your cable Internet connection is more than three Megabits per second. State the null and alternative hypotheses.

### ? Exercise 9.2.1.1

The American family has an average of two children. What is the random variable? Describe in words.

**Answer**

The random variable is the mean number of children an American family has.

### ? Exercise 9.2.1.8

The mean entry level salary of an employee at a company is \$58,000. You believe it is higher for IT professionals in the company. State the null and alternative hypotheses.

### ? Exercise 9.2.1.9

A sociologist claims the probability that a person picked at random in Times Square in New York City is visiting the area is 0.83. You want to test to see if the proportion is actually less. What is the random variable? Describe in words.

**Answer**

The random variable is the proportion of people picked at random in Times Square visiting the city.

### ? Exercise 9.2.1.10

A sociologist claims the probability that a person picked at random in Times Square in New York City is visiting the area is 0.83. You want to test to see if the claim is correct. State the null and alternative hypotheses.

### ? Exercise 9.2.1.11

In a population of fish, approximately 42% are female. A test is conducted to see if, in fact, the proportion is less. State the null and alternative hypotheses.

**Answer**

- a.  $H_0 : p = 0.42$
- b.  $H_a : p < 0.42$

### ? Exercise 9.2.1.12

Suppose that a recent article stated that the mean time spent in jail by a first-time convicted burglar is 2.5 years. A study was then done to see if the mean time has increased in the new century. A random sample of 26 first-time convicted burglars in a recent year was picked. The mean length of time in jail from the survey was 3 years with a standard deviation of 1.8 years.

Suppose that it is somehow known that the population standard deviation is 1.5. If you were conducting a hypothesis test to determine if the mean length of jail time has increased, what would the null and alternative hypotheses be? The distribution of the population is normal.

- a.  $H_0$ : \_\_\_\_\_
- b.  $H_a$ : \_\_\_\_\_

### ? Exercise 9.2.1.13

A random survey of 75 death row inmates revealed that the mean length of time on death row is 17.4 years with a standard deviation of 6.3 years. If you were conducting a hypothesis test to determine if the population mean time on death row could likely be 15 years, what would the null and alternative hypotheses be?

- a.  $H_0$ : \_\_\_\_\_
- b.  $H_a$ : \_\_\_\_\_

#### Answer

- a.  $H_0 : \mu = 15$
- b.  $H_a : \mu \neq 15$

### ? Exercise

The National Institute 9.2.14 of Mental Health published an article stating that in any one-year period, approximately 9.5 percent of American adults suffer from depression or a depressive illness. Suppose that in a survey of 100 people in a certain town, seven of them suffered from depression or a depressive illness. If you were conducting a hypothesis test to determine if the true proportion of people in that town suffering from depression or a depressive illness is lower than the percent in the general adult American population, what would the null and alternative hypotheses be?

- 1.  $H_0$ : \_\_\_\_\_
- 2.  $H_a$ : \_\_\_\_\_

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