Outcomes and the Type I and Type II Errors (Exercises)

Exercise 5

The mean price of mid-sized cars in a region is $32,000. A test is conducted to see if the claim is true. State the Type I and Type II errors in complete sentences.

Answer

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.

Exercise 6

A sleeping bag is tested to withstand temperatures of –15 °F. You think the bag cannot stand temperatures that low. State the Type I and Type II errors in complete sentences.

Exercise 7

For Exercise 9.12, what are α and β in words?

Answer

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

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

Exercise 8

In words, describe $1 - \beta$ For Exercise

Exercise 9

A group of doctors is deciding whether or not to perform an operation. Suppose the null hypothesis, H_0, is: the surgical procedure will go well. State the Type I and Type II errors in complete sentences.

Answer

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.

Exercise 10

A group of doctors is deciding whether or not to perform an operation. Suppose the null hypothesis, H_0, is: the surgical procedure will go well. Which is the error with the greater consequence?

Exercise 11

The power of a test is 0.981. What is the probability of a Type II error?

Answer

0.019

Exercise 12

A group of divers is exploring an old sunken ship. Suppose the null hypothesis, H_0, is: the sunken ship does not contain buried treasure. State the Type I and Type II errors in complete sentences.

Exercise 13

A microbiologist is testing a water sample for E-coli. Suppose the null hypothesis, H_0, is: the sample does not contain E-coli. The probability that the sample does not contain E-coli, but the microbiologist thinks it does is 0.012. The probability that the sample does contain E-coli, but the microbiologist thinks it does not is 0.002. What is the power of this test?

Answer

0.998

Exercise 14

A microbiologist is testing a water sample for E-coli. Suppose the null hypothesis, H_0, is: the sample contains E-coli. Which is the error with the greater consequence?
