

For each of the following identify the parameter and state the null and alternative hypothesis.

1. A team of eye surgeons has developed a new technique for risky eye operations to restore the sight of people blinded by a certain disease. Under the old method, it is known that only 30% of the new patients who undergo this operation recover their eyesight. Can we justify the claim that the new method is better than the old one?
 $H_0: P = 30\%$
 $H_a: P > 30\%$ $P_0 = .3$
2. In 1990, 86.3% of the population of Cortland, New York, was composed of New York natives. Has the percentage of native New Yorkers changed since 1990?
 $H_0: P = 86.3\%$
 $H_a: P \neq 86.3\%$ $P_0 = .863$
3. In a survey conducted 5 years ago, in a major urban area, the percentage of male drivers between the ages of 19 and 29 who did not regularly use seatbelts was 28%. After a major radio and television campaign and stricter enforcement by the local police, researchers want to know if the percentage of male drivers between the ages of 19 and 29 who did not regularly use seatbelts has decreased.
 $H_0: P = 28\%$
 $H_a: P < 28\%$ $P_0 = .28$
4. An allergy drug on the market for a few years gives relief to 75% of those who use it. Now researchers want to know if the new reformulation of the drug works better than the old one.
 $H_0: P = 75\%$
 $H_a: P > 75\%$ $P_0 = .75$
 Parameter: from population (ages)
 Statistics: from sample (\bar{X}, s)
5. Complete the following sentence with the best phrase.
 "A small p-value means the data _____"
 a. Provide strong evidence in favor of the null hypothesis
 b. Was biased
 c. Provide little evidence in favor of the alternative hypothesis
 d. Provide very strong evidence in favor of the alternative hypothesis.

Running the tests

7. In an extensive study, a simple random sample of 500 households was obtained and 80 had experienced property damage of some kind due to crime. A government statistician intends to use this information to determine if the proportion of households damaged due to a crime has decreased from 0.20.
 Identify the parameter: $P_0 = 0.20$ $n = 500$ $X = 80$
 State the Null and Alternative Hypotheses:
 $H_0: P = 0.20$ $H_a: P < 0.20$
 Describe the sampling distribution (random, normal, independent):
 Find the p-value:
 $p = 0.013$ ($\alpha = 0.05$)
 Conclude: Is there any evidence to suggest the proportion of homes damaged due to crime has decreased?
 Reject H_0
 There is evidence that % of crime is less than 0.20.
 Approximately 91% of all adults in South Korea have a cell phone. In a simple random sample of 200 adults in the United States, 171 owned cell phones. Is there any evidence to suggest the proportion for adults who own cell phones in the US is lower than the proportion of adults who own cell phones in South Korea?
 Identify the parameter: $P_0 = .91$ $X = 171$
 State the Null and Alternative Hypotheses:
 $H_0: P = 91\%$ $H_a: P < 91\%$ $n = 200$
 Describe the sampling distribution (random, normal, independent):
 Find the p-value:
 $p = 0.003$ ($\alpha = 0.05$)
 Conclude:
 Reject H_0

There is evidence that the % of US adults with cell phones is less than 91%.

9. Suppose 35% of all people in the United States have seen (or claim to have seen) an unidentified flying object (UFO). A random sample of 750 people in the US is obtained and 120 have seen a UFO. Is there any evidence to suggest the proportion of adults who have seen a UFO is not 35%?

Identify the parameter: $P_0 = .35$ $X = 120$ $N = 750$

State the Null and Alternative Hypotheses:

$$H_0: p = 35\% \quad H_a: p \neq 35\%$$

Describe the sampling distribution (random, Normal, independent):

Find the p-value:

$$p = 0 \quad (\alpha = 0.05)$$

Conclude:

Reject H_0 . There is evidence that 4% of people who have seen a UFO are different from 35%.

TYPE I and TYPE II ERRORS:

10. It has been shown many times that on a certain memory test, recognition is substantially better than recall. However, the probability value for the data from your sample was .12, so you were unable to reject the null hypothesis that recall and recognition produce the same results. What type of error did you make?

TYPE II error (Fail to reject a false H_0)

11. In the population, there is no difference between men and women on a certain test. However, you found a difference in your sample. The probability value for the data was .03, so you rejected the null hypothesis. What type of error did you make?

TYPE I error (reject a true H_0)

12. As the alpha level gets lower, which error rate also gets lower?

TYPE I

13. Beta is the probability of which kind of error?

TYPE II

14. If the null hypothesis is false, you cannot make which kind of error?

TYPE I