

PROBLEMS

1. Heights of U.S. males are known to be distributed with a mean $\mu = 70$ inch and a standard deviation σ of 2 inches. An anthropologist is inquiring as to whether heights of Bora-Bora males are distributed with a variance different from that of U.S. males. A sample of seven Bora-Bora males yields the following heights (in inches):

69 68 68 67 70 71 69

Can the anthropologist reject the hypothesis that heights of Bora-Bora males is distributed with the same variance as the heights of U.S. males?

2. Freshco-Cola sales are distributed over days with a mean of 82,000 bottles per day and a standard deviation of 1500 bottles. It is in Freshco-Cola's interest to reduce this standard deviation because that would make marketing more efficient. Hence, a new advertising technique is introduced with this goal. The first 10 days of using the technique yield the following sales:

| Day | Number of Sales | Day | Number of Sales |
|-----|-----------------|-----|-----------------|
| 1 | 81,752 | 6 | 82,033 |
| 2 | 83,812 | 7 | 81,925 |
| 3 | 82,104 | 8 | 81,599 |
| 4 | 82,529 | 9 | 82,730 |
| 5 | 82,620 | 10 | 81,885 |

- a. Has the new advertising technique been effective in reducing the standard deviation of sales over days?
 b. Does the variance over the first five days using the technique differ from the variance over the last five days?
3. Joe Smith is working for the U.S. Mint. His job is to ensure that new coins are fair—that is, that they have an equal chance of coming up heads or tails when tossed. The government has issued a new coin known as the Nixon nickel, with a portrait of Richard Nixon on the head side and a horse's tail on the tail side. To test the fairness of the Nixon nickel, Joe flips 100 Nixon nickels, and 61 of them turn up tails. Test the following hypotheses:

H_0 : The probability of a Nixon nickel coming up heads is 0.50.

H_1 : The probability of a Nixon nickel coming up heads is not 0.50.

Do *not* use a binomial or a z-test.

4. An anthropologist has a hypothesis that 80% of the inhabitants of Clodovia will be left-handed. From a sample of 200 Clodovians, 140 turn out to be left-handed.

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| <u>IQ</u> | <u>Frequency of People</u> |
|-----------|----------------------------|
| <55 | 20 |
| 55-70 | 17 |
| 71-85 | 29 |
| 86-100 | 52 |
| 101-115 | 63 |
| 116-130 | 42 |
| 131-145 | 13 |
| >145 | 14 |

Would you say that New Yorkers are representative of the U.S. population in terms of their IQ scores?

C H

earlier, particularly the populations from which we assume that the scores are distributed normally. In such tests—say, the F -tests—*have been met*, our differences among groups if there were no differences. We get a F this large if

Occasionally, the data do not. Suppose, for example,