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Write the hypotheses (H_1 and H_0) for Problems 19 – 22

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Do a 1-proportion z-test for Problems 10, 11, 13, 17, 18, 19
Then go back and look at Problem 4

PAGE 451**Problem 19**

Dividend Yield: Australian Bank Stocks Let x be a random variable representing dividend yield of Australian bank stocks. We may assume that x has a normal distribution with $\sigma = 2.4\%$. A random sample of 10 Australian bank stocks gave the following yields.

5.7 4.8 6.0 4.9 4.0 3.4 6.5 7.1 5.3 6.1

The sample mean is $\bar{x} = 5.38\%$. For the entire Australian stock market, the mean dividend yield is $\mu = 4.7\%$ (Reference: *Forbes*). Do these data indicate that the dividend yield of all Australian bank stocks is higher than 4.7%? Use $\alpha = 0.01$.

Problem 20

Glucose Level: Horses Gentle Ben is a Morgan horse at a Colorado dude ranch. Over the past 8 weeks, a veterinarian took the following glucose readings from this horse (in mg/100 ml).

93 88 82 105 99 110 84 89

The sample mean is $\bar{x} \approx 93.8$. Let x be a random variable representing glucose readings taken from Gentle Ben. We may assume that x has a normal distribution, and we know from past experience that $\sigma = 12.5$. The mean glucose level for horses should be $\mu = 85$ mg/100 ml (Reference: *Merck Veterinary Manual*). Do these data indicate that Gentle Ben has an overall average glucose level higher than 85? Use $\alpha = 0.05$.

Problem 21

Ecology: Hummingbirds Bill Alther is a zoologist who studies Anna's hummingbird (*Calypte anna*). (Reference: *Hummingbirds*, K. Long, W. Alther.) Suppose that in a remote part of the Grand Canyon, a random sample of six of these birds was caught, weighed, and released. The weights (in grams) were

3.7 2.9 3.8 4.2 4.8 3.1

The sample mean is $\bar{x} = 3.75$ grams. Let x be a random variable representing weights of Anna's hummingbirds in this part of the Grand Canyon. We assume that x has a normal distribution and $\sigma = 0.70$ gram. It is known that for the population of all Anna's hummingbirds, the mean weight is $\mu = 4.55$ grams. Do the data indicate that the mean weight of these birds in this part of the Grand Canyon is less than 4.55 grams? Use $\alpha = 0.01$.

Problem 22

Finance: P/E of Stocks The price to earnings ratio (P/E) is an important tool in financial work. A random sample of 14 large U.S. banks (J. P. Morgan, Bank of America, and others) gave the following P/E ratios (Reference: *Forbes*).

24 16 22 14 12 13 17
22 15 19 23 13 11 18

The sample mean is $\bar{x} \approx 17.1$. Generally speaking, a low P/E ratio indicates a "value" or bargain stock. A recent copy of *The Wall Street Journal* indicated that the P/E ratio of the entire S&P 500 stock index is $\mu = 19$. Let x be a random variable representing the P/E ratio of all large U.S. bank stocks. We assume that x has a normal distribution and $\sigma = 4.5$. Do these data indicate that the P/E ratio of all U.S. bank stocks is less than 19? Use $\alpha = 0.05$.

Problem 10

College Athletics: Graduation Rate Women athletes at the University of Colorado, Boulder, have a long-term graduation rate of 67% (Source: *The Chronicle of Higher Education*). Over the past several years, a random sample of 38 women athletes at the school showed that 21 eventually graduated. Does this indicate that the population proportion of women athletes who graduate from the University of Colorado, Boulder, is now less than 67%? Use a 5% level of significance.

Problem 11

Highway Accidents: DUI The U.S. Department of Transportation, National Highway Traffic Safety Administration, reported that 77% of all fatally injured automobile drivers were intoxicated. A random sample of 27 records of automobile driver fatalities in Kit Carson County, Colorado, showed that 15 involved an intoxicated driver. Do these data indicate that the population proportion of driver fatalities related to alcohol is less than 77% in Kit Carson County? Use $\alpha = 0.01$.

Problem 13

Wildlife: Wolves The following is based on information from *The Wolf in the Southwest: The Making of an Endangered Species*, by David E. Brown (University of Arizona Press). Before 1918, the proportion of female wolves in the general population of all southwestern wolves was about 50%. However, after 1918, southwestern cattle ranchers began a widespread effort to destroy wolves. In a recent sample of 34 wolves, there were only 10 females. One theory is that male wolves tend to return sooner than females to their old territories, where their predecessors were exterminated. Do these data indicate that the population proportion of female wolves is now less than 50% in the region? Use $\alpha = 0.01$.

Problem 17

Consumers: Product Loyalty *USA Today* reported that about 47% of the general consumer population in the United States is loyal to the automobile manufacturer of their choice. Suppose Chevrolet did a study of a random sample of 1006 Chevrolet owners and found that 490 said they would buy another Chevrolet. Does this indicate that the population proportion of consumers loyal to Chevrolet is more than 47%? Use $\alpha = 0.01$.

Problem 18

Supermarket: Prices *Harper's Index* reported that 80% of all supermarket prices end in the digit 9 or 5. Suppose you check a random sample of 115 items in a supermarket and find that 88 have prices that end in 9 or 5. Does this indicate that less than 80% of the prices in the store end in the digits 9 or 5? Use $\alpha = 0.05$.

Problem 19

Medical: Hypertension This problem is based on information taken from *The Merck Manual* (a reference manual used in most medical and nursing schools). Hypertension is defined as a blood pressure reading over 140 mm Hg systolic and/or over 90 mm Hg diastolic. Hypertension, if not corrected, can cause long-term health problems. In the college-age population (18–24 years), about 9.2% have hypertension. Suppose that a blood donor program is taking place in a college dormitory this week (final exams week). Before each student gives blood, the nurse takes a blood pressure reading. Of 196 donors, it is found that 29 have hypertension. Do these data indicate that the population proportion of students with hypertension during final exams week is higher than 9.2%? Use a 5% level of significance.

Problem 4

Critical Thinking An article in a newspaper states that the proportion of traffic accidents involving road rage is higher this year than it was last year, when it was 15%. Reconstruct the information of the study in terms of a hypothesis test. Discuss possible hypotheses, possible issues about the sample, possible levels of significance, and the “absolute truth” of the conclusion.