Name ______

Elementary Statistics

Date _____

Period _____

Midterm Review

1. The Organization for Economic Cooperation and Development provided the following mean weekly instruction times (hours) for elementary and high school students in various countries. If necessary, round your final answers to the hundredths place.

United States	22.2
France	24.8
Mexico	24.2
China	26.9
Japan	23.8

a. Find the mean.

b. Find the median.

c. Find the range.

d. Find the midrange.

e. Find the sample variance.

f. Find the sample standard deviation.

g. Use the range rule of thumb to identify the range of usual values.

h. Based on the result from part g, are any of the instruction times from the table unusual? Why or why not?

i. What is the level of measurement of the data: nominal, ordinal, interval, or ratio? Explain.

j. Are the data values quantitative or categorical? Explain.

k. There is something fundamentally wrong with using the given times to find statistics such as the mean. What is wrong?

2. In a previous U.S. Open tennis tournament, there were 611 challenges made by singles players, and 172 of them resulted in referee calls that were overturned. The accompanying table lists the results by gender. If necessary, round your final answers to 3 significant digits.

	Challenge Upheld with Overturned Call	Challenge Rejected with No Change
Challenges by Men	121	279
Challenges by Women	51	160

a. If one of the 611 challenges is randomly selected, what is the probability that it resulted in an overturned call?

b. If one of the challenges made by the men is randomly selected, what is the probability that it resulted in an overturned call?

c. If one of the challenges made by the women is randomly selected, what is the probability that it resulted in an overturned call?

d. If one of the overturned calls is randomly selected, what is the probability that the challenge was made by a woman?

e. If two different challenges are randomly selected with replacement, find the probability that they BOTH resulted in an overturned call.

f. If one of the 611 challenges is randomly selected, find the probability that it was made by a man OR was upheld with an overturned call.

g. If one of the challenged calls is randomly selected, find the probability that it was made by a man GIVEN that the call was upheld with an overturned call.

3. The digits 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9 are randomly selected for applications including the selection of lottery numbers and the selection of telephone numbers to be called as part of a survey. In the following tables, the table at the left summarizes actual results from 100 randomly selected digits, and the table at the right summarizes the probabilities of the different digits. If necessary, round your final answers to the tenths place.

Digit	Frequency
0	9
1	7
2	12
3	10
4	10
5	11
6	8
7	8
8	14
9	11

Digit (x)	P(x)
0	0.1
1	0.1
2	0.1
3	0.1
4	0.1
5	0.1
6	0.1
7	0.1
8	0.1
9	0.1

- a. What is the table at the left called?
- b. What is the table at the right called?
- c. Use the table at the left to find the mean. Is the result a statistic or a parameter? Explain.
- d. Use the table at the right to find the mean. Is the result a statistic or a parameter? Explain.

e. If you were to randomly generate 1000 such digits, would you expect the mean of the 1000 digits to be close to the result from part c or part d? Why?

4. Based on a USA Today poll, assume that 10% of the population believes that college is no longer a good investment. If necessary, round your final answers to 3 significant digits.

a. Find the mean and standard deviation if you randomly select 16 people and ask if they believe college is no longer a good investment.

b. Find the probability that among 16 randomly selected people, exactly 4 believe that college is no longer a good investment.

c. Find the probability that among 16 randomly selected people, at least 1 believes that college is no longer a good investment.

d. The poll results were obtained by Internet users logged on to the USA Today web site, and the Internet users decided whether to ignore the posted survey or respond. What type of sample is this? What does it suggest about the validity of the results?

5. Based on a study by Dr. P. Sorita Soni at Indiana University, we know that eye colors in the United States are distributed as follows: 40% brown, 35% blue, 12% green, 7% gray, and 6% hazel.

a. A statistics instructor collects eye color data from her students. What is the name for this type of sample?

b. Identify one factor that might make this particular sample biased and not representative of the general population of people in the United States.

c. If one person is randomly selected, what is the probability that this person will have brown or blue eyes?

d. If two people are randomly selected, what is the probability that at least one of them has brown eyes?

6. Winning a particular jackpot requires that you select five digits between 0 and 9 (and can be repeated) and a sixth number between 1 and 19. Leave your final answers as a fraction in lowest terms.

a. What is the probability that the first five selected digits match the five numbers that are later drawn?

b. What is the probability that the sixth selected number matches the sixth number that is later drawn?

c. What is the probability of winning the jackpot?

7. An engineer is designing a machine to manufacture gloves and she obtains the following sample of hand lengths (mm) of randomly selected adult males.

173 179 207 158 196 195 214 199

a. Use the hand lengths to construct a frequency distribution. Use a class width of 10 mm and use 150 mm as the lower class limit of the first class.

- b. Use the frequency distribution from part a
- c. Use the hand lengths from part a to

to construct a histogram.

construct a stemplot.

d. Instead of using this sample of hand lengths, a much larger sample of hand lengths is used and a frequency distribution is created. The frequencies listed in order are 1, 8, 56, 237, 382, 228, 48, 4, 1. Does it appear that this larger sample is from a population having a normal distribution? Explain.

8. The following data summarizes results from 641 people who responded to a USA today survey. Participants responded to this question: "Who do you most like to get compliments from at work?"

Response	Frequency
Co-workers	260
Boss	241
Strangers	82
People who report to me	58

a. Which of the following graphs would be best for visually illustrating the data in the table: histogram, dotplot, scatterplot, pareto chart, or stemplot? Explain.

b. Is the level of measurement of the 641 individual responses nominal, ordinal, interval, or ratio? Why?

c. How is the following graph misleading? How could it be modified so that it would not be misleading?



9. Listed below is a frequency distribution for the times (in minutes) spent on hygiene and grooming in the morning by randomly selected subjects.

Grooming Time (min)	Frequency
0-9	2
10-19	3
20-29	9
30-39	4
40-49	2

a. Create a cumulative frequency distribution.

b. If this is list of original data values, find the percentile rank of spending 28 minutes on hygiene and grooming.

 $0 \ 5 \ 12 \ 15 \ 15 \ 20 \ 22 \ 24 \ 25 \ 25 \ 25 \ 27 \ 27 \ 28 \ 30 \ 30 \ 35 \ 35 \ 40 \ 45$

c. Find the 5 number summary of the original data values from part b: the minimum value, the first quartile, the second quartile, the third quartile, and the maximum value.

d. Find the interquartile range.

e. Create a boxplot of the original data values.

- 10. In horse racing, a trifecta is a bet that the first three finishers in a race are selected in the correct order.
 - a. In a race with 12 horses, how many different trifecta bets are possible?

b. If the order didn't matter, how many groups of three horses could be made from the 12 total?

c. One of the horses' names is "INFINITY." How many ways can the letters of this horse's name be rearranged?