

MATH 160 **SECTION 2**
Instructor: Selin Kalaycioglu

PRACTICE # FINAL

NAME: _____

You will need a pen or pencil for this test, as well as a statistics-enabled calculator (unless I mention do not use a calculator).

You have 50 minutes to complete the test. Show all your work. Your answers must be legible and straightforward. Where applicable, write full sentences and circle your answers.

Double check your work! Sloppy work, arithmetic mistakes, and gratuitous spelling and grammar will count against you.

1) A survey is conducted on students taking a statistics class. Several variables are measured in the survey. Which of these variables listed below is not quantitative?

- a) the number of credit hours taken during the quarter
- b) the gender
- c) the parents annual income
- d) the High School GPA

2) The Insurance Institute for Highway Safety publishes data on the total damage caused by compact automobiles in a series of controlled, low-speed collisions. The following costs are for a sample of 9 cars, in hundreds of dollars.

10	6	8	10	4	3.5	7.5	8	9
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i) What is the mean of the total damage suffered for this sample of cars?

- a) \$239 b) \$733 c) \$800 d) \$950

ii) Using the correct units, what is the value of the variance?

- a) 224.85 dollars
- b) 238.48 dollars²
- c) 50,555,540 dollars²
- d) 56,875 dollars²

iii) What is the first quartile for this data?

- a) \$350 b) \$500 c) \$600 d) \$800

3) Which of the following is likely to have a mean that is smaller than the median?

- a) the salaries of all National Football League players
- b) the prices of homes in a large city
- c) the scores of students (out of 100 points) on a very easy exam in which most score perfectly, but a few do very poorly
- d) the scores of students (out of 100 points) on a very difficult exam in which most score poorly, but a few do very well

4) A market research company employs a large number of typists to enter data into a computer database. The time taken for new typists to learn the computer system is known to have a normal distribution with a mean of 90 minutes and a standard deviation of 18 minutes. A candidate is automatically hired if he or she learns the computer system in less than 100 minutes. A cut-off time is set at the slowest 10

- a) The proportion of new typists that take more than two hours to learn the computer system is

- b) What proportion of candidates will be automatically hired?
- c) What is the cut-off time the market research company uses?
- 5) Does mandatory gun ownership prevent crime? To study this, the number of burglaries committed each month in a small town were recorded for 75 months prior to passage of a bill requiring citizens to own guns and for 56 months after passage of the bill. The goal was to see if the number of burglaries committed was affected by requiring citizens to own guns. The response variable here is
- whether gun ownership is required by law.
 - the number of burglaries committed.
 - the number of guns owned.
 - whether a burglary was committed by a gun owner.
- 6) Which of the following is true of the correlation coefficient r ?
- It is a resistant measure of association.
 - $-1 \leq r \leq 1$
 - If r is the correlation between X and Y , then r is the correlation between Y and X .
 - All of the above.
- 7) What electrical changes occur in muscles as they get tired? Student subjects hold their arms above their shoulders until they have to drop them. Meanwhile, the electrical activity in their arm muscles is measured. This is
- an observational study.
 - an uncontrolled experiment.
 - a randomized comparative experiment.
- 8) A psychologist studied the time X (in seconds) it took a subject to complete a pencil and paper maze while in the presence of a floral scent. Suppose X has a normal distribution with mean 70 seconds and standard deviation 15 seconds.
- The value of $P(X < 58)$ is
 - The probability is approximately 0.4 that a subject will take more than how many seconds to complete the maze?
- 9) A study of voting chose 663 registered voters at random shortly after an election. Of these 72% said they had voted in the election. election records show that only **56%** of registered voters voted in the election. The bold face number is a
- sampling distribution.
 - parameter.
 - statistic.
- 6) The average age of cars owned by residents of a small city is 6 years with a standard deviation of 2.2 years. A simple random sample of 400 cars is to be selected, and the sample mean age of these cars is to be computed.
- We know the random variable has approximately a normal distribution because of
 - What is the probability that the average age of the 400 cars is more than 6.1 years? (Answer 0.1814)
- a) 0.1814 b) 0.2564 c) 0.567 d) 0.002
- 7) Bags of a certain brand of tortilla chips claim to have a net weight of 14 ounces. Net weights actually vary slightly from bag to bag and are normally distributed with mean μ . A representative of a consumer advocate group wishes to see if there is any evidence that the mean net weight is less than advertised and so intends to test the hypotheses

$$H_0 : \mu = 14, H_a : \mu < 14.$$

To do this, he selects 16 bags of this brand at random and determines the net weight of each. He finds the sample mean to be $\mu = 13.88$ and the sample standard deviation to be $s = 0.24$.

Based on this data

- a) we would reject H_0 at significance level 0.10 but not at 0.05.
- b) we would reject H_0 at significance level 0.05 but not at 0.025.
- c) we would reject H_0 at significance level 0.025 but not at 0.01.
- d) we would reject H_0 at significance level 0.01.

8) In a randomized comparative experiment on the effect of calcium in the diet on blood pressure, researchers divided 54 healthy white males at random into two groups. One group received calcium; the other, a placebo. The paper reporting the study gives $\bar{x} = 114.9$ and $s = 9.3$ for the seated systolic blood pressure of the 27 members of the placebo group. Give a 95% confidence interval for the mean blood pressure in the population from which the subjects were recruited.

9) A researcher wished to compare the average amount of time spent in extracurricular activities by high school students in a suburban school district with that of high schoolers in a school district of a large city. The researcher obtained an SRS of 60 high school students in a large suburban school district and found the mean time spent in extracurricular activities per week to be $\bar{x}_1 = 6$ hours, with a standard deviation $s_1 = 3$ hours. The researcher also obtained an independent SRS of 40 high school students in a large city school district and found the mean time spent in extracurricular activities per week to be $\bar{x}_2 = 4$ hours, with a standard deviation $s_2 = 2$ hours. Let μ_1 and μ_2 represent the mean amount of time spent in extracurricular activities per week by the populations of all high school students in the suburban and city school districts, respectively. Assume the two-sample t-procedures are safe to use.

- i) Find a 95% confidence interval for $\mu_1\mu_2$.
- ii) Suppose the researcher had wished to test the hypotheses

$$H_0 : \mu_1 = \mu_2, H_a : \mu_1 \neq \mu_2.$$

The numerical value of the two-sample t statistic is

- a) 2 b) 3 c) 4 d) 8
- iii) The P-value for the above test is

 - a) larger than 0.10.
 - b) between 0.10 and 0.05.
 - c) between 0.05 and 0.01.
 - d) below 0.01.

10) A noted psychic was tested for ESP. The psychic was presented with 200 cards face down and asked to determine if the card was one of five symbols: a star, cross, circle, square or three wavy lines. The psychic was correct in 50 cases. Let p represent the probability that the psychic correctly identifies the symbol on the card in a random trial.

- i) Find a 95% confidence interval for p .
- ii) Suppose you wished to see if there is evidence that the psychic is doing better than just guessing. To do this you test the hypotheses

$$H_0 : p = 0.20, H_a : p > 0.20.$$

The P-value of your test is

- a) between .10 and .05.
- b) between .05 and .01.

c) between .01 and .001.

d) below .001.

11) In a large midwestern university (the class of entering freshmen is 6000 or more students), an SRS of 100 entering freshmen in 1999 found that 20 finished in the bottom third of their high school class. Admission standards at the university were tightened in 1995. In 2001, an SRS of 100 entering freshmen found that 10 finished in the bottom third of their high school class. Let p_1 and p_2 be the proportion of all entering freshmen in 1999 and 2001, respectively, who graduated in the bottom third of their high school class.

i) Find a 99% confidence interval for $p_1 - p_2$.

ii) Is there evidence that the proportion of freshmen who graduated in the bottom third of their high school class in 2001 has been reduced, as a result of the tougher admission standards adopted in 2000, compared to the proportion in 1999? To determine this, you test the hypotheses

$$H_0 : p_1 = p_2, H_a : p_1 > p_2.$$

The value of the z-statistic for testing these hypotheses is a) 1.20 b) 1.65 c) 1.96 d) 1.98

iii) The P-value of the above test is

a) between .10 and .05.

b) between .05 and .01.

c) between .01 and .001.

d) below .001.

12) The temperature at any random location in a kiln used in the manufacture of bricks is normally distributed with a mean of 1000 and a standard deviation of $50^\circ F$.

i) If bricks are fired at a temperature above $1125^\circ F$, they will crack and must be disposed of. If the bricks are placed randomly throughout the kiln, the proportion of bricks that crack during the firing process is closest to

a) 49.38% b) 2.28 % c) 47.72% d) 0.62%

ii) When glazed bricks are put in the oven, they will miscolor if the temperature is below $950^\circ F$. If the bricks are placed randomly throughout the kiln, the proportion of glazed bricks that miscolor is closest to

a) 49.38% b) 2.28 % c) 47.72% d) 0.62%