Name:_____ Date:_____

AP Stats Chapter 10 Review #1 Confidence Interval

1. A random sample of 30 students at Moscrop Highschool was allowed to play a popular cell phone game for an hour in order to score as many points as possible. The sample yielded an average score of 375 and a standard deviation of 100. The resulting 90% confidence interval is 375 ± 31 . Which of the following statements best summarizes the meaning of this confidence interval?
   a) There is a 90% chance that a randomly selected student at Moscrop will score between 344 and 406 points
   b) Approximately 90% of the students at Moscrop will have an average score between 344 and 406 points
   c) If we repeated this procedure many times, about 10% of the confidence intervals constructed would fail to include the mean number of points scored by all students at Moscrop
   d) If we repeated this procedure many times, the average number of points scored by our sample of 30 students will be between 344 and 406 points approximately 90% of the time
   e) Approximately 10% of all students at Moscrop will score more than 406 points

2. A real estate agent collected information on the selling price (in dollars) and size (in ft2) of 6 recently sold homes in her area. A regression analyst was performed and the output is given below:

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Model Summary          S     R-sq  R-sq(adj)  R-sq(pred)
                  27484.1   97.28%     96.60%      28.80%

Coefficients Term        Coef  SE Coef  T-Value  P-Value   VIF
             Constant  -19061    23090    -0.83    0.455
             Size      112.73     9.43    11.96    0.000  1.00

Regression Equation Price = -19061 + 112.73 Size
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Which of the following should be used to compute a 95% confidence interval for the slope of the regression line?

a) $-19061 \pm (2.132)(23090)$ b) $-19061 \pm (2.776)(23090)$ c) $112.73 \pm (1.96)(9.43)$

d) $112.73 \pm (2.132)(9.43)$ e) $112.73 \pm 2.776(9.43)$

3. A recent survey randomly sampled 25 HS students. They were asked the following question: "How many times per day do you access a social media site such as FB, Instagram, etc?". The average number of times reported in the sample was 5.6 with a sample standard deviation of 2.6. A 90% confidence interval for the population mean number of times per day HS students visit social media sites is:

a) $5.6 \pm 1.96\left(\frac{2.6}{\sqrt{25}}\right)$ b) $5.6 \pm 1.645\left(\frac{2.6}{\sqrt{24}}\right)$ c) $5.6 \pm 1.711\left(\frac{2.6}{\sqrt{24}}\right)$

d) $5.6 \pm 1.711\left(\frac{2.6}{\sqrt{25}}\right)$ e) $5.6 \pm 2.064\left(\frac{2.6}{\sqrt{24}}\right)$

4. A large sample 99% confidence interval for the proportion of Canadian adults that climate chance is a serious problem is (0.61, 0.69). What is the sample proportion of Canadian adults that believe climate change is a serious problem from which this interval was constructed?

   A) 4% b) 8% c) 65% d) 66%
   e) It can not be determined from the information given

5. A researcher selects a random sample of size "n" from a population and uses the collected data to compute a 95% confidence interval for the mean of the population. If the same data were used to compute a second confidence interval, which of the following would produce a confidence interval with a larger margin of error?
    a) Increasing the confidence level
    b) Decreasing the confidence level
    c) Increasing the sample size
    d) Computing the interval "n" times so that approximately 5% of these intervals will be larger
    e) None of the above can guarantee a larger margin of error

6. Independent random samples of 100 luxury cars and 250 non-luxury cars in a certain city are examined to see if they have bumper stickers. Of the 250 non-luxury cars, 125 have bumper stickers and of the 100 luxury cars, 30 have bumper stickers. Which of the following is a % confidence interval for the difference in the proportion of non-luxury cars with bumper stickers and the proportion of luxury cars with bumper stickers from the population of cars represented by these samples?

a) $(0.5-0.3)\pm 1.645\sqrt{\frac{(0.5)(0.5)}{250}+\frac{(0.3)(0.7)}{100}}$ b) $(0.5-0.3)\pm 1.96\sqrt{\frac{(0.5)(0.5)}{250}+\frac{(0.3)(0.7)}{100}}$

c) $(0.5-0.3)\pm 1.645\sqrt{\left(\frac{155}{350}\right)\left(\frac{195}{350}\right)\left(\frac{1}{250}+\frac{1}{100}\right)}$ d) $(0.5-0.3)\pm 1.96\sqrt{\left(\frac{155}{350}\right)\left(\frac{195}{350}\right)\left(\frac{1}{250}+\frac{1}{100}\right)}$

e) $(0.5-0.3)\pm 1.645\sqrt{(0.4)(0.6)\left(\frac{1}{250}+\frac{1}{100}\right)}$

7. Both over-the-counter Niacin and the prescription drug Lipitor are known to lower blood cholesterol levels. In one double-blinded study Lipitor outperformed Niacin. The 95% confidence interval estimate of the difference in mean cholesterol level lowering was (18,41). Which of the following is a reasonable conclusion ?
    a) Niacin lowers cholesterol an average of 18points, while Lipitor lowers cholesterol an average of 41 points
    b) There is a 0.95 probability that Lipitor will outperform Niacin in lowering the cholesterol level of any given individual
    c) There is a 0.95 probability that Lipitor will outperform Niacin by at least 23 points in lowering the cholesterol level of any given individual
    d) We should be 95% confident that Lipitor will outperform Niacin as a cholesterol-lowering drug
    e) None of the above

8. A survey is conducted to determine the percentage of students at state universities who change their major at least once. In an SRS of 100 students, 78% indicated that they graduated with a major different from the one with which they entered college. Determine a 95% confidence interval for the percentage of students who change their major:

A) 68.2% to 87.8% b) 68.5% to 87.5% c) 69.9% to 86.1% d) 71.2% to 84.8% e) 73.9% to 82.1%

9. To determine the mean cost of groceries in a certain city, an identical grocery basket of food is purchased at each store in a random sample of ten stores. If the average cost is \$47.52 with a standard deviation of \$1.59, find a 98% confidence interval estimate for the cost of these groceries in the city:

$a)\$47.52 \pm \$0.45 \quad b)\$47.52 \pm \$1.17 \quad c)\$47.52 \pm \$1.39 \quad d)\$47.52 \pm \$1.42 \quad e)\$47.52 \pm \$4.49$

10. In a simple random survey of 89 teachers at Moscrop, 73 said that it was the best school they had ever taught. Establish a 98% confidence interval estimate of the proportion of all high school AP Stats teachers who feel this way?

$a)0.820 \pm 0.004 \quad b)0.820 \pm 0.041 \quad c)0.820 \pm 0.084 \quad d)0.820 \pm 0.095 \quad e)0.820 \pm 0.223$

11. The Canadian Medical Association (CMA) wishes to determine the percentage of obstetricians who are considering leaving the profession because of the rapidly increasing number of lawsuits against obstetricians. How large a sample should be taken to find the answer to within $\pm 3\%$ at the 95% confidence level?

    a) 6 b) 33 c) 534 d) 752 e) 1068

12. Based on a survey of a random sample of 900 adults in Canada, a journalist reports that 60% of adults in Canada are in favor of increasing the minimum hourly wage. If the reported percent has a margin of error of 2.7%, which of the following is closest to the level of confidence?

    a) 80.0% b) 90.0% c) 95.0% d) 95.5% e) 99.0%

13. A large sample 98% confidence interval for the proportion of hotel reservations that are cancelled on the intended arrival day is (0.048,0.11). What is the point estimate for the proportion of hotel reservations that are cancelled on the intended arrival day from which this interval was constructed?

    a) 0.032 b) 0.064 c) 0.080 d) 0.160
    e) It cannot be determined using the information given:

14. A random sample of 50 students at a large highschool resulted in a 95% confidence interval for the mean number hours of sleep per day of (6.73, 7.67). Which of the following statements best summarizes the meaning of this confidence interval?

    a) About 95% of all random samples of 50 students from this population would result in a 95% confidence interval of (6.73, 7.67)

    b) About 95% of all random samples of 50 students from this population would result in a 95% confidence interval that covered the population mean number of hours of sleep per day

    c) 95% of the students in the survey reported sleeping between 6.73 and 7.67 hours per day

    d) 95% of the students in this high school sleep between 6.73 and 7.67 hours per day

    e) A student selected at random from this population sleeps between 6.73 and 7.67 hours per day for 95% of the time

15. A random sample of 432 voters revealed that 100 are in favor of a certain bond issue. A 95% confidence interval for the proportion of the population of voters who are in favor of the bond issue is:

$a)\ 100 \pm 1.96\sqrt{\frac{0.5(0.5)}{432}}$ $b)\ 100 \pm 1.645\sqrt{\frac{0.5(0.5)}{432}}$ $c)\ 100 \pm 1.96\sqrt{\frac{0.231(0.759)}{432}}$

$d)\ 0.231 \pm 1.96\sqrt{\frac{0.231(0.76)}{432}}$ $e)\ 0.231 \pm 1.645\sqrt{\frac{0.231(0.769)}{432}}$

16. In 2009 a survey of Internet usage found that 79% of adults age 18 years and older in Canada use the Internet. An internet company believes that the percent is greater now than it was in 2009 and will conduct a survey. The company plans to construct a 98% confidence interval to estimate the current percent and wants the margin of error to be no more than 2.5% points. Assuming that at least 79% of adults use the Internet, which of the following should be used to find the sample size "n" needed?

$a)\quad 1.96\sqrt{\frac{0.5}{n}} \le 0.025$ $b)\quad 1.96\sqrt{\frac{(0.5)(0.5)}{n}} \le 0.025$ $c)\quad 2.33\sqrt{\frac{(0.5)(0.5)}{n}} \le 0.05$

$d)\quad 2.33\sqrt{\frac{(0.79)(0.21)}{n}} \le 0.025$ $e)\quad 2.33\sqrt{\frac{(0.79)(0.21)}{n}} \le 0.05$

17 As part of a class project at a large university, Amber selected a random sample of 12 students in her major field of study. All students in the sample were asked to report their number of hours spent studying for the final exam and their score on the final exam. A regression analysis on the data produced the following partial computer output.

Predictor	Coef	SE Coef	T	P
Constant	62.328	4.570	13.64	0.000
Study Hours	2.697	0.745	3.62	0.005
S = 5.505	R-sq = 56.7%			

Amber wants to compute a 95 percent confidence interval for the slope of the least squares regression line in the population of all students in her major field of study. Assuming that conditions for inference are satisfied, which of the following gives the margin of error for the confidence interval?

(A) $(2.228)(0.745)$ (B) $(2.228)\left(\frac{0.745}{\sqrt{12}}\right)$ (C) $(2.228)(5.505)$ (D) $(2.228)\left(\frac{5.505}{\sqrt{12}}\right)$ (E) $(2.228)(2.697)$

Answers:

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17			

Review #2:

AP stat 2006

Patients with heart-attack symptoms arrive at an emergency room either by ambulance or self-transportation provided by themselves, family, or friends. When a patient arrives at the emergency room, the time of arrival is recorded. The time when the patient's diagnostic treatment begins is also recorded.

An administrator of a large hospital wanted to determine whether the mean wait time (time between arrival and diagnostic treatment) for patients with heart-attack symptoms differs according to the mode of transportation. A random sample of 150 patients with heart-attack symptoms who had reported to the emergency room was selected. For each patient, the mode of transportation and wait time were recorded. Summary statistics for each mode of transportation are shown in the table below.

Mode of Transportation	Sample Size	Mean Wait Time (in minutes)	Standard Deviation of Wait Times (in minutes)
Ambulance	77	6.04	4.30
Self	73	8.30	5.16

(a) Use a 99 percent confidence interval to estimate the difference between the mean wait times for ambulance-transported patients and self-transported patients at this emergency room.

(b) Based only on this confidence interval, do you think the difference in the mean wait times is statistically significant? Justify your answer.

When using a one-sample *t*-procedure to construct a confidence interval for the mean of a finite population, a condition is that the population size be at least 10 times the sample size. The reason for the condition is to ensure that

(A) the sample size is large enough

(B) the central limit theorem is applicable for the sample mean

(C) the sample standard deviation is a good approximation of the population standard deviation

(D) the degree of dependence among observations is negligible

(E) the sampling method is not biased