Math 10 Fall 2015   **FORM A**   Name Last:_____ First:_____

Exam 3:   Chapters 8, 9, 10   Class Time:_____

INSTRUCTIONS:

- Print your **NAME** and **CLASS TIME** on **THIS EXAM**.
- Print your **NAME** and **CLASS TIME** on your S**CANTRON**.
- Write **FORM A** on your **SCANTRON**.
- Turn your cell phone OFF. Any noise from a cell phone will signal that your exam is over.
- Each question has exactly one BEST answer. There are 21 questions.
- You may write on this exam. There is no scratch paper allowed.
- Each question is worth 5 points for a total of 105 points.
- **If you have no note page**, you must write **NO NOTES** on your **SCANTRON**.
- Put your SCANTRON and PAGE of NOTES inside your EXAM. Before you start packing up your things, turn in your EXAM and SCANTRON. Then go back to your desk to pack up your materials. When your exam is returned, you will get back all your materials.
- **FAILURE TO FOLLOW ALL INSTRUCTIONS WILL COST YOU 5 POINTS!**

Questions 1 – 3 refer to the following:
A California housing agency is planning to put a bond tax on the state ballot for the next election. In order to pass the bond, two-thirds (2/3) of voters in the state must vote in favor of the measure. To see if there is sufficient support, a survey of 873 registered voters in California is taken. Five hundred seventy-eight (578) voters are in favor of the bond. Does this indicate that less than two-thirds (2/3) of the voters will support the parcel tax?   Conduct an appropriate hypothesis test.

1. The alternate hypothesis is:

A. $p \geq 2/3$ B. $p = 2/3$ C. $p < 2/3$ D. $p \leq 2/3$

2. At the 5% significance level, the correct conclusion is

A. the bond tax will get at least 2/3's of the vote.
B. the bond tax will get 65% of the vote.
C. the bond tax will not get 2/3's of the vote.
D. the bond tax will get less than 2/3's of the vote.

3. The Type II Error for this test is

A. to conclude that the bond tax will pass (get 2/3's of the vote), when it really will pass.
B. to conclude that the bond tax will not pass, when it really will pass.
C. to conclude that the bond tax will not pass, when it really will not pass.
D. to conclude that the bond tax will pass, when it really will not pass.

Questions 4 – 8 refer to the following:
While the average birthweight of babies born is the U.S. is about 3300 grams, the average birthweight for babies born in poverty in the U.S. is approximately 2800 grams. Recently, a large hospital introduced an innovative new prenatal care program claimed to reduce the number of low birthweight babies born in poverty. In the first year of the program, 25 mothers, all of whom live in poverty, participated. Babies born to these women had an average birthweight of 3075 grams, with a standard deviation of 500 grams.
At a 1% significance level, was the hospital claim correct? (Assume that the underlying distribution is normal.)

4. The Null and Alternate Hypotheses are:

A. $H_0: \mu = 2800$ B. $H_0: \mu = 3075$ C. $H_0: \mu = 2800$ D. $H_0: \mu = 2800$
    $H_a: \mu \neq 2800$ $H_a: \mu \neq 3075$ $H_a: \mu > 2800$ $H_a: \mu = 3075$

5. The distribution to use for this test is:

A. $N\left(2800, \dfrac{500}{\sqrt{25}}\right)$ B. $N\left(3075, \dfrac{500}{\sqrt{25}}\right)$ C. t_{25} D. t_{24}

6. The Type I Error for this problem is to conclude that

A. the average birthweight of babies in the program is 2800 grams when it is 2800 grams.
B. the average birthweight of babies in the program is 3075 grams, when it is more than 3075 grams.
C. the average birthweight of babies in the program is more than 2800 grams, when it is 2800 grams.
D. the average birthweight of babies in the program is 2800 grams, when it is not 2800 grams.

7. Interpret the p-value.

A. If the true average birthweight is 2800 grams, the probability of getting a sample mean of at most 3075 grams is 0.0056.
B. If the true average birthweight is 2800 grams, the probability of getting a sample mean of at least 3075 grams is 0.0056.
C. If the true average birthweight is 2800 grams, the probability of getting a sample mean of at most 2525 grams or at least 3075 grams is 0.0030.
D. If the true average birthweight is 2800 grams, the probability of getting a sample mean of at least 3075 grams is 0.0030.

8. A 99% confidence interval for the true population mean is:

A. (2879, 3271)   B. (2817, 3332)   C. (2868, 3281)   D. (2795, 3355)

Questions 9 – 12 refer to the following:
Suppose a pharmaceutical company developed a new drug, designed to prevent the flu. The company states that the drug is more effective for women than for men. To test this claim, the drug was given to a random sample of 200 women and a random sample of 200 men.

At the end of the study 41% of the women caught the flu and 52% of the men caught the flu. Conduct a hypothesis test to determine if the percentage for women is different than the percentage for men.

9. This is a test of:

A. Two means, population standard deviation unknown.
B. Two means, population standard deviation known.
C. Two proportions.
D. Matched pairs.

10. The distribution to use for the hypothesis test is:

A. normal   B. binomial   C. t   D. need more information

11. This hypothesis test for this problem:

A. must be a two-tailed test.
B. must be a right-tailed test.
C. must be a left-tailed test.
D. can be any type of test, depending on how the hypotheses are set up.

12. At the 2% level of significance, the appropriate conclusion is:

A. The proportion of women who caught the flu is lower than the proportion of men.
B. The proportion of women who caught the flu is the same as the proportion of men.
C. The proportion of women who caught the flu is higher than the proportion of men.
D. The proportion of women who caught the flu is not the same as the proportion of men.

Questions 13 - 15 refer to the following:
An electronics company advertises that their new cell phone battery lasts longer after charging than the previous battery. A consumer agency decides to check out the claim. From a random sample of 60 new cell phone batteries and 60 previous cell phone batteries the following results are produced:

Length of time the battery lasts after charging:

New cell phone battery: mean $= 11.8$ hours, standard deviation $= 2.1$ hours
Previous cell phone battery: mean $= 11.1$ hours, standard deviation $= 1.8$ hours

13. Set up the appropriate set of hypotheses:

A. H_0: $\mu_{NEW} \leq \mu_{PREVIOUS}$
   H_a: $\mu_{NEW} > \mu_{PREVIOUS}$

B. H_0: $\mu_{NEW} = \mu_{PREVIOUS}$
   H_a: $\mu_{NEW} \neq \mu_{PREVIOUS}$

C. H_0: $\mu_{NEW} \geq \mu_{PREVIOUS}$
   H_a: $\mu_{NEW} < \mu_{PREVIOUS}$

D. H_0: $\mu_{NEW} > \mu_{PREVIOUS}$
   H_a: $\mu_{NEW} \leq \mu_{PREVIOUS}$

14. Find the single best point estimate (in hours) for the true difference between the average length of time the battery lasts after charging between the new cell phone battery and the previous cell phone battery.

A. (-0.14, 1.54)   B. 0.7   C. 0   D. none of these.

15. At the 2% level of significance, the correct conclusion is:

A. The average length of time the battery lasts after charging is higher for the new battery than for the previous battery.
B. The average length of time the battery lasts after charging is lower for the new battery than for the previous battery.
C. The average length of time the battery lasts after charging is at least as high for the new battery than for the previous battery.
D. The average length of time the battery lasts after charging is no higher for the new battery than for the previous battery.

Questions 16 - 18 refer to the following:

A random sample of 9 overweight adult patients was weighed before and after six months of hypnosis therapy.

The results are below.

Patient	1	2	3	4	5	6	7	8	9
Before Weight (pounds)	270	288	331	269	220	301	343	315	281
After Weight (pounds)	259	290	329	265	208	295	331	318	283

Did patients lose weight with hypnosis therapy?

16. The random variable for this test is:

A. ⬜ = The difference in the average patient weight before and after hypnosis therapy.

B. ⬜ = The average difference in patients' weights before and after hypnosis therapy.

C. ⬜ = The average difference in patients' weights before and after hypnosis therapy.

D. ⬜ = The difference in the average patient weight before and after hypnosis therapy.

17. The distribution to use for this test is:

A. N(0, 0.6.3047)   B. N(0, 5.9442)   C. t_8 D. t_9

18. At the 4% level of significance, what is the appropriate conclusion?

A. On average, patients did lose weight with hypnosis therapy.
B. On average, patients did not lose weight with hypnosis therapy.
C. The average patient weight before hypnosis therapy was less than the average patient weight after hypnosis therapy.
D. The average patient weight before hypnosis therapy was more than the average patient weight after hypnosis therapy.

Questions 19 - 21 refer to the following:
Bags of a certain brand of corn chips are labeled as having a net weight of 9 ounces. A consumer advocacy group is interested in whether there is evidence that the average net weight is less than advertised. A random sample of 64 bags yields an average net weight of 8.79 ounces with a standard deviation of 1.6 ounces.

19. What is the error bound for the 90% confidence interval for the true population average net weight of bags of corn chips?

A. 0.6580   B. 1.3160   C. 0.6678   D. 0.3339

20. If the consumer group wanted to decrease the width of the confidence interval, which of the following would achieve this?

    I. Increase the confidence level.
    II. Increase the sample size.
    III. Increase the population size.

A. I only   B. II only   C. I and II   D. I, II and III

21. Interpret the 90% confidence interval:

A. If we took repeated samples, approximately 90% of the samples would produce the same confidence interval.
B. If we took repeated samples, approximately 90% of the confidence intervals calculated from these samples would contain the sample mean.
C. If we took repeated samples, approximately 90% of the confidence intervals calculated from these samples would contain the true population mean.
D. If we took repeated samples, the sample mean would equal the population proportion in approximately 90% of the samples.

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Did patients lose weight with hypnosis therapy?

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Question	Form A	Form B
1	C	D
2	A	B
3	D	C
4	C	C
5	D	A
6	C	A
7	B	B
8	D	C
9	C	D
10	A	C
11	A	B
12	B	D
13	A	C
14	B	A
15	D	D
16	B	A
17	C	B
18	A	D
19	D	B
20	B	C
21	C	A