

Math 10 Winter 2015 Form A Name: Last: _____ First: _____
Exam 3: Chapters 8, 9, 10 Class Time: _____

- Put your NAME and CLASS TIME on THIS EXAM.
- Print your NAME and CLASS TIME on your Scantron.
- Print FORM A on your SCANTRON.
- Each question has exactly one BEST answer. There are 21 questions.
- You may write on this exam. There is no scratch paper allowed.
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Questions 1 – 4 refer to the following:

Suppose a math instructor believes that the proportion of students who passed Exam 1 was higher in afternoon classes (A) than in morning classes (M). In a sample of her afternoon students 19 out of 29 students passed Exam 1. In a sample of her morning students 17 out of 27 students passed Exam 1. Should we conclude that that instructor's belief is correct?

1. The appropriate alternate hypothesis is

- A. $p_A < p_M$ B. $p_A \leq p_M$ C. $p_A > p_M$ D. $p_A \geq p_M$

2. Give the distribution for the random variable to be used for this test.

- A. $P'_A - P'_B \sim N[0, \sqrt{(0.64)(0.36)(\frac{1}{27} + \frac{1}{29})}]$
B. $P'_A - P'_B \sim t_{55}$
C. $P'_A - P'_B \sim N[0.42, \sqrt{(0.64)(0.36)(\frac{1}{27} + \frac{1}{29})}]$
D. Cannot be determined

3. At a 5% level of significance, the appropriate conclusion is

- A. The teacher is right, the afternoon classes had the same or lower pass rate as the morning classes.
B. The teacher is wrong, the afternoon classes had the same or lower pass rate as the morning classes.
C. The teacher is wrong, the afternoon classes had a lower pass rate as the morning classes.
D. The teacher is right, the afternoon classes had a lower pass rate as the morning classes.

4. For this study 17/27 is a:

- A. Parameter B. Variable C. Sample D. Point Estimate

5. On December 10, 2014 at an event honoring the late Nelson Mandela's life, it was reported that a Canadian hockey player who appeared at the event did not know who Nelson Mandela was. Suppose you are interested in finding out if the percent of Americans who know who Nelson Mandela was is higher than 30%. <http://www.theblaze.com/stories/2014/12/10/hockey-player-has-no-idea-who-nelson-mandela-was-goes-to-event-honoring-mandela-and-does-an-interview-anyway-watch-the-painful-video/>

The type of hypothesis test you would use is:

- A. single proportion
- B. two independent means; student t-distribution
- C. single mean
- D. two population proportions; normal distribution

Questions 6 - 8 refer to the following:

A survey of 12 people was done to see if there was a statistically significant difference in vision acuity between their left eye and right eye. The survey found an average difference of 0.033log MAR with a standard deviation of 0.049log MAR. At a 5% level of significance, is there a difference in vision measurements if the differences were computed as "right eye vision minus left eye vision"?

6. The appropriate test and true distribution to use for the test is:

- A. two independent means; normal distribution
- B. two independent means; student t-distribution
- C. matched or paired samples; student t-distribution
- D. matched or paired samples; normal distribution

7. Define the random variable in words

- A. $\bar{X}_R - \bar{X}_L$ = the difference between average right eye and average left eye visual acuity
- B. $\bar{X}_L - \bar{X}_R$ = the difference between average left eye and average right eye visual acuity
- C. P'_d = the difference in proportion of right eye to left eye visual acuity
- D. \bar{X}_d = the average of the difference between right and left eye visual acuity

8. If a p-value of 0.0196 was obtained, then at a level of significance of 5%, the appropriate conclusion would be:

- A. There is a difference between the average right eye and average left eye visual acuity.
- B. The visual acuity readings for a person's left and right eye are different, on average.
- C. There is not a difference between the average right eye and average left eye visual acuity.
- D. A person's right eye gives a higher visual acuity than their left eye.

Questions 9 - 13 refer to the following:

Suppose you need to finish building cabinets with screws that cannot be longer than 0.50 inches. You buy a package of 300 screws that are labeled as 0.50 inches long. Having just completed a Statistics course, you decide to measure a random sample of 25 screws from the package. Your sample produced an average of 0.5026 inches with a standard deviation of 0.0102 inches. Conduct a hypothesis test to see if the average length is at most 0.50 inches.

9. The distribution to be used for this test is:

- A. $N(0.50, 0.0102)$ B. t_{299} C. t_{24} D. $N(0.50, 0.0020)$

10. The appropriate null hypothesis for this test is

- A. $\mu > 0.50$ B. $\mu \leq 0.50$ C. $\bar{x} \leq 0.5026$ D. $\bar{x} \geq 0.5026$

11. Find a 94% confidence interval for the population average length of screws.

- A. (0.4986, 0.5066)
B. (0.4991, 0.5061)
C. (0.4724, 0.5328)
D. (0.4988, 0.5064)

12. At a 6% level of significance, the appropriate decision is to:

- A. Reject the null hypothesis because the p-value = 0.1073
B. Reject the null hypothesis because the p-value = 0.05
C. Not reject the null hypothesis because the p-value = 0.05
D. Not reject the null hypothesis because the p-value = 0.1073

13. A consequence of making a Type I error is:

- A. Using screws that are too long.
B. Returning usable screws to the hardware store.
C. Using screws that don't hold the cabinets together because they are too short.
D. Returning unusable screws to the hardware store.

Questions 14 - 17 refer to the following:

The rainy season in California runs from November to April, generally. A study was conducted to determine if the month of February has a lower average rainfall than the month of March. A random sample of rainfall totals from 1986 – 2006 was taken.

(<http://www.wrcc.dri.edu/cgi-bin/cliMONtpre.pl?casjos>)

The sample statistics were:

Month	Average rainfall (inches)	Standard deviation (inches)	Sample size
February (F)	1.26	1.04	5
March (M)	2.98	1.41	6

14. The random variable and appropriate distribution for this test is:

- A. $\bar{X}_d \sim t_{11}$
- B. $\bar{X}_F - \bar{X}_M \sim N(0, \sqrt{\frac{1.04^2}{5} + \frac{1.41^2}{6}})$
- C. $\bar{X}_F - \bar{X}_M \sim t_{8.91}$
- D. $\bar{X}_d \sim N(0, -1.72)$

15. The appropriate hypothesis are:

- A. $H_0: \mu_F \geq \mu_M$
 $H_a: \mu_F < \mu_M$
- B. $H_0: \mu_F \leq \mu_M$
 $H_a: \mu_F > \mu_M$
- C. $H_0: \mu_d \geq 0$
 $H_a: \mu_d < 0$
- D. $H_0: \mu_F < \mu_M$
 $H_a: \mu_F \geq \mu_M$

16. At a 1% level of significance, the appropriate conclusion is:

- A. The average rainfall in February is lower than in March.
- B. The average rainfall in March is lower than in February.
- C. The average rainfall in March is at least as much as in February.
- D. The average rainfall in February is at least as much as in March.

17. The Type II error is to believe:

- A. The rainfall in February is higher than in March, when, in fact, the rainfall in February is at most as much as in March.
- B. The rainfall in February is at least as much as in March, when, in fact, the rainfall is lower in February.
- C. The rainfall in February is lower than in March, when, in fact, the rainfall in February is at least as much as in March.
- D. The rainfall in February is at most as much as in March, when, in fact, the rainfall is higher in February.

Questions 18 - 21 refer to the following:

According to a Rasmussen poll taken December 11, 2014, 47% of likely US voters agree that waterboarding and other aggressive interrogation techniques should be used to gain information from suspected terrorists. You believe that the percent of De Anza students who agree is less than the results reported by the Rasmussen poll. Suppose you take a survey of De Anza students and find that 26 of 57 students agree that waterboarding and other aggressive interrogation techniques should be used to gain information from suspected terrorists.

http://www.rasmussenreports.com/public_content/politics/general_politics/december_2014/despite_report_voters_still_see_value_in_cia_interrogation_tactics

18. Define the population parameter.

- A. p' = the proportion of the 57 De Anza students who believe waterboarding and other aggressive interrogation techniques should be used to gain information from suspected terrorists.
- B. p' = the proportion of the 57 US voters who believe waterboarding and other aggressive interrogation techniques should be used to gain information from suspected terrorists.
- C. p = the proportion of all De Anza students who believe waterboarding and other aggressive interrogation techniques should be used to gain information from suspected terrorists.
- D. p = the proportion of all likely US voters believe waterboarding and other aggressive interrogation techniques should be used to gain information from suspected terrorists.

19. Explain what the p-value means for this problem.

- A. If the null hypothesis is true, then there is a 0.4170 probability that the sample proportion is 0.4561 or less.
- B. If the null hypothesis is true, then there is a 0.4561 probability that the sample proportion is 0.4170 or more.
- C. If the null hypothesis is true, then there is a 0.0500 probability that the sample proportion is 0.4561 or more
- D. If the null hypothesis is false, then there is a 0.4170 probability that the sample proportion is 0.4561 or less.

20. Find the margin of error for a 91% confidence interval for the population proportion of De Anza students who believe waterboarding and other aggressive interrogation techniques should be used to gain information from suspected terrorists.

- A. 0.91 B. 0.05 C. 0.46 D. 0.11

21. The best point estimate for the population proportion of De Anza students who believe waterboarding and other aggressive interrogation techniques should be used to gain information from suspected terrorists is

- A. 0.4170 B. 0.4561 C. 27 D. 0.0500

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ANSWERS

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