Ch 23-25 Multiple Choice Review Key

1. Some people fear insurance coverage can affect healthcare decisions. A survey of several randomly selected hospitals in Vermont found that 16.6% of 223 births were cesarean sections, compared to 18.8% of 186 births in New Hampshire. Is this evidence that the cesarean rate in the two states is different? Which test is it?

B (A) 1 proportion Z-test
(B) 2 proportion Z-test
(C) T-test for mean
(D) Difference of 2 independent means t-test
(E) Paired means t-test

compare 2 prop

2. A survey asked women, "Did you get more than 30 minutes of vigorous exercise today?" We should use a _____.

A (A) 1 proportion Z-test
(B) 2 proportion Z-test
(C) T-test for mean
(D) Difference of 2 independent means t-test
(E) Paired means t-test

yes No Ques

3. At one SAT test site students were asked to volunteer for a study involving oxygen and testing. Students were randomly assigned to two groups: those who took the first half of the exam under regular conditions and the second half with excess oxygen pumped into the testing room. The second group began the test with excess oxygen and finished under normal circumstances. Which test should we use?

D (A) 1 proportion Z-test
(B) 2 proportion Z-test
(C) T-test for mean
(D) Difference of 2 independent means t-test
(E) Paired means t-test

2 indep groups

1. *USA Today* asked, “Who was the hero of the US Hockey team at the Sochi Olympics?” 65 percent of the respondents chose Patrick Kane. The telephone poll of 615 adults had a margin of error of 4 percent. Which of the following statements best describes what is meant by the 4 percent margin of error?

(A) About 4 percent of adults were expected to change their minds between the time of the poll and its publication in *USA Today*.
(B) About 4 percent of adults did not have telephones.
(C) About 4 percent of the 615 adults polled refused to answer.
(D) Not all of the 615 adults knew anything about the Olympics.
(E) The difference between the sample percentage and the population percentage is likely to be less than 4 percent.

E margin of error is the +/−

2. An automobile manufacturer claims that the average gas mileage of a new model is 35 miles per gallon (mpg).
A consumer group is skeptical of this claim and thinks the manufacturer is overstating the average gas mileage.
If μ represents the true average gas mileage for this new model, which of the following gives the null and alternative hypotheses that the consumer group should test to protect the public?

(A) H_0: μ = 35 mpg
H_a: μ > 35 mpg

(B) H_0: μ = 35 mpg
H_a: μ < 35 mpg

(C) H_0: μ = 35 mpg
H_a: μ ≠ 35 mpg

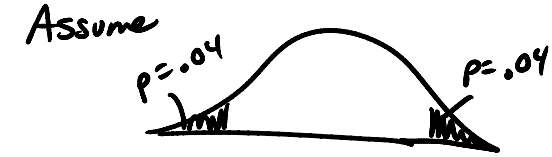
"overstating"
consumer watchdog

B

4. Two botanists analyzed the same set of data, testing the same Ho about the proportion of tomato plants suffering from blight. The first one rejected the Ho, the second did not. Assuming neither made any calculation mistakes, how could this be true?

(A) The first botanist used a one-tailed Ha, the second used a two-tailed Ha.
(B) The second botanist used a one-tailed Ha, the first used a two-tailed Ha.
(C) The first botanist used a lower alpha.
(D) The first botanist used a higher alpha.

A&C (A&D) B&C B&D



$\alpha = .05$
$\alpha = .10$

5. A professor was curious about her students' GPAs. She took a random sample of 15 students and found a sample mean of 3.01 with a standard deviation of 0.534. Which is the correct formula for a 99% CI?

(A) $3.01 \pm (2.947)\left(\frac{0.534}{\sqrt{15}}\right)$
(B) $3.01 \pm (2.977)\left(\frac{0.534}{\sqrt{15}}\right)$
(C) $3.01 \pm (2.576)\left(\frac{0.534}{\sqrt{15}}\right)$
(D) $3.01 \pm (2.947)\left(\frac{0.534}{\sqrt{14}}\right)$
(E) $3.01 \pm (2.977)\left(\frac{0.534}{\sqrt{14}}\right)$

B

(E)

$df = 14$
$n = 15$

5. When a virus is placed on a tobacco leaf, small lesions appear on the leaf.
To compare the mean number of lesions produced by two different strains of virus, one strain is applied to half of each of 8 tobacco leaves, and the other strain is applied to the other half of each leaf.
The strain that goes on the right half of the leaf is decided by a coin flip.
The lesions that appear on each half are then counted.

	Leaf 1	Leaf 2	Leaf 3	Leaf 4	Leaf 5	Leaf 6	Leaf 7	Leaf 8
# lesions on right half	31	20	18	17	9	8	10	7
# lesions on left half	18	17	14	11	10	7	5	6

What is the number of degrees of freedom associated with the appropriate *t*-test for testing to see if there is a difference between the mean number per leaf produced by the two strains?

A
(A) 7
(B) 8
(C) 11
(D) 14
(E) 16

6. When should you choose a *t*-test rather than a *z*-test when making an inference about the mean of a population?

(A) The standard deviation of the population is unknown.
(B) The mean of the population is unknown.
(C) The sample may not have been a simple random sample.
(D) The population is not normally distributed.
(E) The sample size is less than 100.

A

16. Ten students were randomly selected from a high school to take part in a program designed to raise their reading comprehension. Each student took a test before and after completing the reading program.
The mean improvement of the score after the program and the score before the program is 16.
It was decided that all students in the school would take part in this program during the next school year.
Let μ_A denote the mean score after the program and μ_B denote the mean score before the program for all students in the school. The 95 percent confidence interval estimate of the true mean difference for all students is (9, 23).
Which of the following statements is a correct interpretation of this confidence interval?

(A) $\mu_A > \mu_B$ with probability 0.95.
(B) $\mu_A < \mu_B$ with probability 0.95.
(C) μ_A is around 23 and μ_B is around 9.
(D) For any μ_A and μ_B with $(\mu_A - \mu_B) \geq 14$, the sample result is quite likely.
(E) For any μ_A and μ_B with $9 < (\mu_A - \mu_B) < 23$, the sample result is quite likely.

E

18. A large experiment involving male physicians, attempted to determine whether aspirin could help prevent heart attacks.
In this study, about half of the people took an aspirin every other day, while a control group took a placebo.
After several years, the group that took aspirin had significantly fewer heart attacks than the control group.
Which of the following statements explains why it would not be appropriate to say that everyone should take an aspirin every other day?

T I. The study included only physicians, and different results may occur in individuals in other occupations.
T II. The study included only males and there may be different results for females.
III. Although taking aspirin may be helpful in preventing heart attacks, it may be harmful to some other aspects of health.

I + II are true

(~~A) I only~~
(~~B) II only~~
(~~C) III only~~
(~~D) II and III~~ I only
E (E) I, II, and III

24. A random sample of the costs of repair jobs at a large muffler repair shop produces a mean of $127.95 and a standard deviation of $24.03. If the size of this sample is 40, which of the following is an approximate 90 percent confidence interval for the average cost of a repair at the repair shop?

(A) $127.95 ± $4.87
(B) $127.95 ± $6.45
(C) $127.95 ± $7.45
(D) $127.95 ± $30.81
(E) $127.95 ± $39.53

B

use tinterval in calc

29. In a hypothesis test H_0: μ = 10 and H_a: μ > 10. The sample mean comes from a normal population and is 13.4. The *z*-score for the sample is 2.12 and the *p*-value is 0.017. Which of the following conclusions could be drawn?

(A) There is reason to conclude that μ > 10.
(B) Due to random fluctuation, 48.3 percent of the time a sample produces a mean larger than 10.
(C) 1.7 percent of the time, rejecting the alternative hypothesis is in error.
(D) 1.7 percent of the time, the mean is above 10.
(E) 98.3 percent of the time, the mean is below 10.

A

pvalue = .017 .... so probably reject Ho and believe Ha

33. A 95 percent confidence interval for a proportion wants to be created. Which is the smallest sample size that will guarantee a margin of error of at most 0.08?

C
(A) 25
(B) 100
(C) 150
(D) 250
(E) 625

$.08 = 1.96\sqrt{\frac{.5(.5)}{n}}$

$n = 150.06$

34. The process of producing pain-reliever tablets yields tablets with varying amounts of the active ingredient. It is claimed that the average amount of active ingredient per tablet is at least 200 milligrams. The Consumer Watchdog Bureau tests a random sample of 70 tablets. The mean content of the active ingredient for this sample is 194.3 milligrams, while the standard deviation is 21 milligrams.
What is the *p*-value for the appropriate test?

A
(A) 0.013
(B) 0.024
(C) 0.050
(D) 0.100
(E) 0.488

use Calc
t test
one tail

35. A survey was conducted of 100 random college seniors.
They were asked, “Would you have chosen to different major if they could start over?”
34 percent indicated that they would have studied a different major.
Calculate a 90 percent confidence interval for the percentage of all college seniors who would have studied a different major.

(A) 24.7% to 43.3%
(B) 25.8% to 42.2%
C (C) 26.2% to 41.8%
(D) 30.6% to 37.4%
(E) 31,2% to 36.8%

use Calc
1-prop z interval

25. Chemistry final exam scores are approximately normally distributed, with a mean of 75 and a stdev of 12.
The scores on the calculus final are also approximately normally distributed, with a mean of 80 and stdev of 8.
A student scored 81 on the chemistry final and 84 on the calculus final.
Relative to the students in each respective class, in which subject did this student do better?

$\text{chem } z = \frac{81-75}{12} = .5$

$\text{calc } z = \frac{84-80}{8} = .5$

(A) The student did better in chemistry.
(B) The student did better in calculus.
C (C) The student did equally well in each course.
(D) There is no basis for comparison, since the subjects are different from each other and are in different departments.
(E) There is not enough information for comparison, because the number of students in each class is not known

38. A historian wants to test whether the average height of soldiers in WWII was greater than that of soldiers in WWI. ***H*o: $\mu_{WWI} - \mu_{WW2} = 0$ and *H*a: $\mu_{WWI} - \mu_{WW2} < 0$?**

	Mean	Stdev	Sample size
WWI	unknown	2.5	100
WWII	1" greater	2.3	100

What conclusion is justified from a two-sample hypothesis t-test?

A (A) The observed difference in average height is significant.
(B) The observed difference in average height is not significant.
(C) A conclusion is not possible without knowing the mean height of each sample.
(D) A conclusion is not possible without knowing both the sample means and the two original population sizes.

use calc 2 mean t-test
make up heights 1" apart
such as 65" and 66"

17. Gina's standardized score (*z*-score) for her blood pressure is 1.50, compared to women her age. Which of the following is the best interpretation of this standardized score?

B (A) Gina's systolic blood pressure is 150.
(B) Gina's systolic blood pressure is 1.50 standard deviations above the blood pressure of women her age.
(C) Gina's systolic blood pressure is 1.50 above the blood pressure of women her age.
(D) Gina's systolic blood pressure is 1.50 times the blood pressure for women her age.
(E) Only 1.5% of women Gina's age have a higher blood pressure than she does.