Review 4

1) The average number of mosquitos caught in 36 mosquito traps in a particular   1) _____
   environment was 800 per trap. The standard deviation of mosquitos caught in the entire
   population of traps is 100 mosquitos. What is the 99% confidence interval for the true
   mean number of mosquitos caught in all mosquito traps?
      A) $753 < \mu < 847$ B) $757 < \mu < 843$
      C) $767 < \mu < 833$ D) $764 < \mu < 836$

2) A study of 95 apple trees showed that the average number of apples per tree was 525.   2) _____
   The standard deviation of the population is 150. What is the 90% confidence interval
   for the mean number of apples per tree for all trees? If a tree is found to have 600
   apples, would you believe that?
      A) $500 < \mu < 550$,   yes, I would.   B) $495 < \mu < 550$,   No I wouldn't.

3) The winning team's score in 5 high school basketball games was recorded. If the   3) _____
   sample mean is 62.3 points and the sample standard deviation is 11.0 points, find the
   98% confidence interval of the true mean.
      A) $57.4 < \mu < 67.2$ B) $43.9 < \mu < 80.7$
      C) $50.8 < \mu < 73.8$ D) $25.4 < \mu < 99.2$

4) 7 squirrels were found to have an average weight of 9.3 ounces with a sample standard   4) _____
   deviation is 0.9. Find the 95% confidence interval of the true mean weight.
      A) $8.6 < \mu < 10.0$ B) $9.0 < \mu < 9.6$
      C) $8.5 < \mu < 10.1$ D) $7.1 < \mu < 11.5$

5) In a survey of 260 registered voters, 135 of them wished to see Mayor W lose her next   5) _____
   election. Construct a 98% confidence interval for the proportion of registered voter who
   want to see Mayor W defeated.
      A) $0.447 < p < 0.591$ B) $0.458 < p < 0.580$
      C) $0.488 < p < 0.550$ D) $0.352 < p < 0.687$

6) A report states that 44% of home owners had a vegetable garden. How large a sample   6) _____
   is needed to estimate the true proportion of home owners who have vegetable gardens
   to within 6% with 95% confidence? If the info from the report is not used, what is the
   sample size?
      A) 526, 560   B) 263, 267

7) At a certain university, the average cost of books was $370 per student last semester 7) _____
and the population standard deviation was $90. This semester a sample of 40 students
revealed an average cost of books of $400 per student. The Dean of Students believes
that the costs are greater this semester. Use a level of significance $\alpha = 0.05$:
a) State the hypotheses b) Find the critical value. c) Compute the test value. d) Make a
decision. e) Summarize the results.

A) a. $H_0: \mu = 370$, $H_1: \mu > 370$

b. Critical value: 1.645

c. Z = 2.11

d. Reject the null hypothesis.

e. There is enough evidence to support the claim that the average cost of books is
greater than 370.

B) a. $H_0: \mu = 400$, $H_1: \mu > 400$

b. Critical value: 1.96

c. Z = 2.11

d. Fail to reject the null hypothesis.

e. There is not enough evidence to support the claim that the average cost of books
is greater than 400.

8) An extensive study conducted in 1980 concluded that the mean mercury level in oysters 8) _____
from the White Bear estuary was 0.025 parts per million (ppm) with a standard
deviation $\sigma = 0.022$ ppm. In 2012, a sample of 50 oysters from the same estuary
exhibited a mean mercury concentration of 0.018 ppm. Use the $\alpha = 0.01$ level of
significance.
a) State the hypotheses b) Find the critical value. c) Compute the test value. d) Make a
decision. e) Can you conclude that the 2012 mercury concentration is lower than in
1980?

A) a. $H_0: \mu = 0.018$, $H_1: \mu < 0.018$

b. Critical value: -2.326

c. Z = -2.25

d. Reject the null hypothesis.

e. No. There is insufficient evidence to conclude that the mercury concentration
has decreased from 1980 to 2012.

B) a. $H_0: \mu = 0.025$, $H_1: \mu < 0.025$

b. Critical value: -2.326

c. Z = -2.25

d. Fail to reject the null hypothesis.

e. No. There is insufficient evidence to conclude that the mercury concentration
has decreased from 1980 to 2012.

9) Reginald Brown, an inspector from the Department of Weights and Measures, weighed 15 eighteen-ounce cereal boxes of corn flakes. He found their mean weight to be 17.8 ounces with a standard deviation of 0.4 ounces. At $\alpha = 0.01$, are the cereal boxes lighter than they should be?

9) _____

10) Science fiction novels average 290 pages in length. The average length of 14 randomly chosen novels written by I. M. Wordy was 305 pages in length with a standard deviation of 35. At $\alpha = 0.05$, are Wordy's novels significantly longer than the average science fiction novel?

10) _____

1) B
2) A
3) B
4) C
5) A
6) B
7) A
8) B
9) $H_0 : \mu = 18.0$ (claim) and $H_1 : \mu < 18.0$

Critical value: -2.624

Test value: -1.94

Do not reject the claim since -1.94 does not fall within the critical region.

There is not enough evidence to reject the claim that the cereal boxes weigh 18 ounces.

10) $H_0 : \mu = 290$ and $H_1 : \mu > 290$ (claim)

Critical value: 1.771

Test value: 1.604

The conclusion is to not reject the null hypothesis.

There is not enough evidence to support the claim that Wordy's novels are longer than the average science fiction novel.