EXAM 3 Review
Chapters 6 – 7.2

1A. A sociologist found that in a sample of 49 retired men, the average number of jobs they had
during their lifetimes was 7.2. The standard deviation of the sample was 2.1. Construct a 90%
confidence interval for the mean number of jobs a man had during his lifetime.

B. Interpret your result in terms of the problem.

2. A department store wants to estimate the mean age of the customers in its contemporary apparel
department correct to within 2 years with 95% confidence. If we assume the standard deviation
of ages is 5 years, how many customers need to be selected?

3A. A sample of 15 private-duty nurses showed an average weekly wage of $480.75. The standard
deviation of the sample was $56. Find the 98% confidence interval of the true mean weekly
wage.

B. Interpret your result in terms of the problem.

4A. A survey of 150 new car buyers showed that 60 preferred a white automobile. Find the 95%
confidence interval for the true proportion of buyers who preferred a white car.

B. Interpret your result in terms of the problem.

5. A researcher wishes to estimate, with 95% confidence, the proportion of people who own a large
screen television. The proportion is expected to be approximately 40%. The researcher wishes
to be accurate to within 2% of the true proportion. How many people need to be surveyed?

6. The city council wants to determine what proportion of voters in the city would be opposed to
increasing the salary of the mayor. How large a sample is required in order to be 95% confident
that the sample proportion will be within 2% of the true proportion?

7. You are considering buying a hotel. Before buying the business you would like to get an
idea of the past earnings of the hotel. Suppose you would buy the hotel if the evidence showed
that the true mean daily profit is more than $1,600. Your hypotheses are
\[ H_0: \mu \leq 1600 \quad \text{and} \quad H_A: \mu > 1600 \]

What is a Type I Error in the context of this problem?

8. Set up the hypotheses for the following claims:
A. The mean cost of textbooks is at least $110.
B. The mean age of FCCJ students is 25 years.
C. The mean commute time in Jacksonville is more than 15 minutes.

9. Find the p-value for the following situations. Assume \( n > 30 \).
A. \( H_0: \mu \leq 14, \ H_A: \mu > 14, \ Z = 1.92 \)
B. \( H_0: \mu \geq 56, \ H_A: \mu < 56, \ Z = -2.43 \)
C. \( H_0: \mu = 133 \quad H_A: \mu \neq 133, \ Z = 2.71 \)
10. For each of the following, state whether or not the null hypothesis should be rejected for the given p-value and significance level $\alpha$.
   A.  p-value = 0.0298  $\alpha = 0.05$
   B.  p-value = 0.0050  $\alpha = 0.10$
   C.  p-value = 0.0293  $\alpha = 0.01$

11. A large retailer wants to determine whether the mean income of families living within two miles of a proposed building site exceeds $24,400. What can he conclude at the 0.04 level of significance, if the mean income of a random sample of 60 families living within two miles of the proposed site is $24,524 and the standard deviation is $763? [Use the p-value approach]

12. The average number of colds a child will get per year is 6 with a standard deviation of 1. A doctor claims that children from a rural community will have fewer colds per year than the average. A group of 64 children from a rural community were selected and they had an average of 5 colds per year. At $\alpha = 0.10$, do you have sufficient evidence to support the doctor’s claim? [Use the classical approach]

13A. The manager of a pizza parlor claims his employees make an average of $4.50 per hour, with a standard deviation of $0.75. Bob does not believe this claim so he takes a sample of 50 employees and finds their average salary is $4.25. At the 0.02 level of significance do you have enough evidence to reject the manager’s claim? [Use the classical approach]

B. Find the p-value of the test in part a.

ANSWERS
1A.  6.707 < $\mu$ < 7.694
2.  25
3A.  $442.81 < \mu < 518.69$
4A.  0.322 < $p$ < 0.478
5.  2305
6.  2401
7. Based on the sample data, you decide the mean daily profit is more than $1,600 (so you buy the hotel), but in reality the mean daily profit is less than or equal to $1,600 (and you end up losing money).
8A. $H_0$: $\mu \geq 110$, $H_A$: $\mu < 110$  B. $H_0$: $\mu = 25$, $H_A$: $\mu \neq 25$
C. $H_0$: $\mu \leq 15$, $H_A$: $\mu > 15$
9A.  0.0274  B.  0.0075  C.  0.0067
10A. Reject $H_0$  B. Reject $H_0$  C. Fail to Reject $H_0$
11. T.S. = 1.26, p-value = 0.1038, Fail to reject $H_0$
12. T.S. = -8, Reject $H_0$
13A. T.S. = -2.36, Reject $H_0$  B. 0.0182