Exam Sample Question Solutions

These are solutions to the final exam practice. Note that the actual exam will be longer and may contain a different mix of questions. Use these questions to test your preparedness for the final and to get an idea of what the questions will be like.

1. A standardized test designed to measure math anxiety has a mean of 100 and a standard deviation of 10 in the population of entering Global MBA students. Which of the following observations would you suspect is an outlier?
   a. 150
   b. 100
   c. 90
   d. All of the above
   e. None of the above

2. Company “X” conducts a survey of a sample of employees to obtain their opinions about the company’s current health insurance. A questionnaire is sent to a simple random sample of 100 employees. One question asks for a response to the statement “The company health insurance should provide coverage for well-baby care even if employee costs must be increased to pay for it.” The possible responses are (1) Strongly Agree, (2) Agree (3) Neutral (4) Disagree (5) Strongly Disagree. The population in this sample survey is
   a. Employees at all companies like Company “X”
   b. All employees at Company “X”
   c. The 100 employees sent this questionnaire
   d. The 5 possible answers
   e. None of the above

3. A machine is designed to fill 16 ounce bottles of shampoo. When the machine is in control, the mean amount poured into the bottles is 16.05 ounces with a standard deviation of .05 ounces. A sample of several bottles taken while the process was in control revealed an approximately normal histogram. You want to set up control limits with a 5% false alarm risk for a single bottle of shampoo. The control limits should be
   a. 16.05 and 32.10 ounces
   b. –0.10 and +0.10 ounces
   c. 16.00 and 16.10 ounces
   d. **15.95 and 16.15 ounces**
   e. 14.05 and 18.05 ounces

4. If you want to decrease the width of a confidence interval, which of the following sets of actions will certainly do so?
   a. Increase the sample size and increase the confidence level.
   b. **Increase the sample size and decrease the confidence level.**
   c. Decrease the sample size and increase the confidence level.
   d. Decrease the sample size and decrease the confidence level.
   e. None of the above will decrease the width of a confidence interval
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5. The Physicians’ Health Study, a large medical experiment involving 22,000 male physicians, attempted to determine whether aspirin can help prevent heart attacks or whether aspirin made no difference. One group of 11,000 physicians took an aspirin every second day, while the rest took a placebo. After several years, it was found that subjects in the aspirin group had fewer heart attacks by a statistically significant amount than subject in the placebo group. Write down the null hypothesis and alternative hypothesis that were tested in this study. What conclusion did the study draw about the null hypothesis?

In words:
\[ H_0: \text{The mean number of heart attacks for people who take an aspirin every second day is greater than or equal to the mean number of heart attacks for those that do not take aspirin.} \]
\[ H_a: \text{The mean number of heart attacks for people who take an aspirin every second day is less than the mean number of heart attacks for those that do not take aspirin.} \]

In symbols, let \( \mu_1 \) be the mean number of heart attacks for the population that takes aspirin every other day and \( \mu_2 \) be the mean number of heart attacks for those that do not. Then:
\[ H_0: \mu_1 \geq \mu_2 \]
\[ H_a: \mu_1 < \mu_2 \]

Note that the solution posed a one-sided set of hypotheses, since if the treatment is effective we want to prove that it decreases heart attacks.

The study rejected the null hypothesis.

6. What would be the most appropriate test to perform in question 5?
   a. One sample t-test
   b. Two-sample t-test
   c. Two-sample z-test
   d. Matched pairs t-test
   e. None of the above.

For questions 7-10: The human relations department of a large company was interested in constructing a model of company manager’s salaries. To do so, they extracted a random sample of data for 220 managers. On the next page is the regression output for salary (in thousand dollars) regressed on years of experience.
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Summary of Fit

| Term                        | Estimate | Std Error | t Ratio | Prob>|t| |
|-----------------------------|----------|-----------|---------|------|
| Intercept                   | 135.0259 | 1.807573  | 74.70   | <.0001 |
| YearsExper                  | 0.7484551| 0.154502  | 4.84    | <.0001 |

7. What does the \( p \)-value for the years of experience variable (YearsExper) mean?
   a. Years of experience is significant in explaining salary.
   b. The slope of the regression line is significantly different from zero.
   c. The intercept of the regression line passes through the origin
   d. **Both a and b are correct.**
   e. None of the above.

8. What does the model predict for the average salary for a person with 10 years of experience?
   a. $135.77
   b. $142.51
   c. $135,773.85
   d. **$142,509.94**
   e. None of the above.

9. What is the interpretation of the \( R^2 \)?
   a. **9.7% of the variation in salary is explained by years of experience.**
   b. 9.7% of the variation in years of experience is explained by salary.
   c. 97.2% of the variation in salary is explained by years of experience.
   d. 97.2% of the variation in years of experience is explained by salary.
   e. None of the above.

10. What is the interpretation of the slope?
    a. For a 0.748 year of experience increase, salary increases by $1,000.
    b. For each yearly increase in experience, salary increases by $74.80.
    c. For a 1% increase in years of experience, salary increases by $748.
    d. **For each yearly increase in experience, salary increases by $748.**
    e. None of the above.