

Stat 2300 International, Fall 2006 – Sample Final

Friday, December 1, 2006

Your Name: _____

A Number: _____

The Final consists of 40 questions: 20 multiple-choice questions (with exactly 1 correct answer) and 20 text-based questions where you have to provide a verbal explanation or calculate one or multiple numerical values. Some of the questions require you to use Excel. For other question, you can decide yourself whether you want to use Excel, a calculator, or do the calculations by hand.

The exam is worth a total of **500 points**. The number of points for each question is indicated in parentheses at the beginning of each question. You have approximately **180 minutes** to complete the exam. Try to correctly answer as many questions as possible during this time period. **You are allowed to answer questions in any order.** Start with a question that seems the easiest for you. If you cannot answer a question within a short time, move to another question, and come back to the previously unanswered questions toward the end of the exam.

Mark your answers to the multiple choice questions and fill in the spaces for the text-based questions on the **answer sheets**. Do not write your answers on the pages with the questions. However, you can use those pages for personal comments and calculations. Make sure to write your name and your A number on the pages with the questions **and** on the answer sheets. You have to turn in the pages with the questions **and** the answer sheets.

For multiple choice questions, mark exactly one of the choices (representing options a, b, c, or d) with a solid dot. Only 1 answer is correct. If you mark more than 1 of the options, this will automatically be an incorrect answer (even if one of the options you have marked is correct). For the text-based questions, indicate the formula you are using, the numerical values you have to fill in, and the final result (e.g., $n*p = 10*0.2 = 2$). Just the (correct) final result will not provide you with the full points for this question. If you use Excel to calculate a result, indicate which feature you have used (e.g., Summary Statistics) and the result from within Excel. Please do not write outside the text boxes.

In case of any problems with Excel, please inform your local instructor as quickly as possible and try to answer the questions as far as possible. Return to these questions later on. In case Excel is unavailable for an extended time period, your exam score will be adjusted accordingly.

Note: This Sample Final includes only 10 multiple-choice questions and 10 text-based questions. It does not include multiple-choice or text-based questions from chapters that were covered in the Midterm. However, the actual Final WILL include that portion of the material, covered in the remaining questions. Also, similar to the linear regression questions 15-20 in this Sample Final, the actual Final will contain a set of Excel-based ANOVA questions.

1. **(10 Points)** When carrying out a sample test (with σ known) of $H_0: \mu = 10$ vs. $H_a: \mu > 10$ by using a rejection point, we reject H_0 at level of significance α if and only if the calculated test statistic is
 - a. less than Z_α
 - b. less than $-Z_\alpha$
 - c. greater than $Z_{\alpha/2}$
 - d. greater than Z_α

2. **(10 Points)** What is the p -value when we test $H_0: \mu = 10$ versus $H_a: \mu < 10$ and have a calculated test statistic $Z = -2.41$ (σ is known)
 - a. .008
 - b. -.008
 - c. .016
 - d. .4920

3. **(10 Points)** A financial analyst working for a financial consulting company wishes to find evidence that the average price-to-earnings ratio in the consumer industry is higher than average price-to-earnings ratio in the banking industry. The alternative hypothesis is
 - a. $\mu_{consumer} - \mu_{banking} = 0$
 - b. $\mu_{consumer} - \mu_{banking} \leq 0$
 - c. $\mu_{consumer} - \mu_{banking} > 0$
 - d. $\mu_{consumer} - \mu_{banking} < 0$

4. **(10 Points)** In testing the difference between the means of two normally distributed populations using independent samples with known variances the correct test statistic to use is
 - a. Z statistic.
 - b. t statistic.
 - c. F statistic.
 - d. None of the above.

5. **(10 Points)** In testing a hypothesis about the Mean, μ_d , of a population of paired differences, the correct test statistic to use is:
 - a. Z statistic.
 - b. t statistic.
 - c. F statistic.
 - d. None of the above.

6. **(10 Points)** In two-way ANOVA, we first test the
 - a. significance of factor 1.
 - b. significance of factor 2.
 - c. significance of main effects.
 - d. interaction between factors 1 and 2.

7. **(10 Points)** Different levels of a factor are called
 - a. treatments.
 - b. variables.
 - c. responses.
 - d. observations.

8. **(10 Points)** All of the following are assumptions of the error terms in the simple linear regression model except
 - a. normality.
 - b. error terms with a mean of zero.
 - c. constant variance.
 - d. variance of one.

9. **(10 Points)** _____ measures the strength of the linear relationship between the dependent and the independent variable.
 - a. Simple correlation coefficient
 - b. Distance value
 - c. Y intercept
 - d. Normal plot

10. **(10 Points)** In order to test the significance of the multiple regression model, we use:
 - a. the partial F test
 - b. t test
 - c. the overall F test
 - d. Durbin Watson test

Use the following to answer questions 11-14:

It has been hypothesized that on average employees spend one hour a day playing video games at work. To test this at her company, a manager takes a random sample of 35 employees who showed a mean time of 55 minutes per day with a standard deviation of 5 minutes.

11. **(15 Points)** Set up the null and alternative hypothesis to test the claim that the company's playing time differs from the national average.

12. **(15 Points)** Calculate the appropriate test statistic to test the hypotheses.

13. **(15 Points)** What is the rejection point for testing these hypotheses at $\alpha = .01$ and on which distribution is this based? Indicate the degrees of freedom if appropriate.

14. (15 Points) Indicate a 98% confidence interval for the population mean time all employees in this particular company spend on video games at work.

The chairman of the marketing department at a large state university undertakes a study to relate starting salary (y) after graduation for marketing majors to grade point average (GPA) in major courses. To do this, records of seven recent marketing graduates are randomly selected. Download the data set

http://www.math.usu.edu/~symanzik/teaching/2006_stat2300/data/StartSal.xls from the Web and use Excel to answer questions 15-20.

15. (15 Points) Obtain the least squares point estimates for the intercept (b_0) and the slope (b_1).
16. (15 Points) Use the least squares line to obtain a point estimate of the mean starting salary for all marketing graduates having a grade point average of 3.25.
17. (15 Points) Indicate the residual sum of squares (SSE) and use this to calculate s^2 and s .
18. (15 Points) Identify s_{b_1} and the t statistic for testing the significance of the slope. Show how t has been calculated by using b_1 and s_{b_1} .
19. (15 Points) Identify the p -value for testing $H_0: \beta_1 = 0$ versus $H_a: \beta_1 \neq 0$. Using the p -value, determine whether we can reject H_0 by setting α equal to .10, .05, .01, and .001. What do you conclude about the relationship between GPA and starting salary?
20. (15 Points) Indicate the 95% confidence interval for β_1 .