Review Materials for FINAL

Exam coverage: Chapters 1, 2, 4, 5, 8, 9, 10.1, 10.3, 12.1, 13, 14, 17, 19, 20.1-20.3, 21.1-21.4, 26.1-26.4

BRING A CALCULATOR, ID, FORMULA SHEET, TEXTBOOK, AND THINGS TO WRITE WITH FOR THE EXAMINATION. THIS IS AN OPEN BOOK FINAL.

Suggested Extra Problems From Your Textbook: Chapter 8 Set A: #2 #6 Set B: #1, #2 Set D: #1 Chapter 9 Set A: #2 - #6 Set C: #1 **Chapter 10.1 and 10.3** Set A: #1 - #4 Set C: #1, #2 Chapter 12.1 Set A: #1, #2 **General Problems for Review** Starting on page 265 #13, #15, #17, #18 Starting on Page 428 #1. #3, #8, #9, #11, #16, #20, #27, #30 Starting on Page 565 #3, #4

Starting on Page 567 #1, #2, #8, #9, #11, #15, #17, #18, #20, #22, #26

Concepts and formulas: treatment & control (p. 3), confounding (p. 4) randomized controlled (p. 5), placebo (p. 5), double blinding (p. 5), observational studies (p. 12), association (p. 12), average (p. 59), standard deviation (p. 67), normal curve (p. 78), standard units (p. 79), finding the area under the normal curve (p. 82), normal approximation (p. 85), percentiles (p. 88), change of scale (p. 92), scatter diagram (p. 119), correlation coefficient (p. 125), properties of the correlation coefficient (Chapter 9), regression (Chapter 10.1), using the regression method for individuals and percentiles (p. 165-166), using the regression line for individuals (chapter 12.1), chance or probability (p. 222), probability rules, (p. 223), sampling with and without replacement (p. 225), multiplication rule (p. 229), independence (p. 230-23), addition rule (p. 241), mutually exclusive (p. 241), expected value for the sum (p. 289) box average (p. 289), standard error (p.291), SD of a box (p. 291), expected value, standard error and normal curve (p. 294-296). Short cut formula for boxes with only 2 tickets (p. 298), zero-one boxes (p. 301). Population, sample, parameters, statistics, selection bias, non-response bias, simple random sampling, probability methods (Chapter 19), expected value for a sample percentage (p. 359), SE for a percentage (p. 360), using the normal curve with sample percentages (Chapter 20.3), the confidence interval and its interpretation (p. 381-388), tests of significance (p. 475), the null and alternative (p.479), test statistic (p. 480), z test interpretation (p. 480), significance level (p. 481), p- value (p. 482)

1. Here are two statistics on National Football League players in 1997

\$500,000 per year \$1,750,000 per year

Which one of these numbers is the mean salary and which one is the median salary of National Football League Players?

The mean is _____

The median is_____

Explain your choice in the space below.

2. The IQ scores of adult humans (age 18 and over) is approximately normal with a mean of 100 and a standard deviation of 15.

(a) How low is the lowest 5% of all IQ scores (that is, at or below what IQ score is the lowest 5%) How high is the highest 10% of IQ scores (that is, at or above what IQ Score is the highest 10%)?

(b) A simple random sample of 25 college students is drawn from the adult human population. The sample average is 108 and the sample standard deviation is 30. Please test the hypothesis that college students have higher IQ scores than the average human. State a null and an alternative hypothesis, perform a test, state a p-value and explain your result (do you reject or not reject the null and why). Use a 5% level of significance as your decision rule.

3. Investors ask about the relationship between returns on investments (the money you make by investing your money) in the United States and on investments overseas. Below is a table of total returns on investments on U.S. and overseas stocks over a 10 year period.

	Year	Overseas	U.S.
		% Return	% Return
	1987	24.6	5.1
	1988	28.5	16.8
	1989	10.6	31.5
	1990	-23	-3.1
	1991	12.8	30.4
	1992	-12.1	7.6
	1993	32.9	10.1
	1994	6.2	1.3
	1995	11.2	37.6
	1996	6.4	23
Average	1991.5000	9.8100	16.0300
Standard Deviation	2.7386	15.6493	12.6810

(a) Find the correlation, r, of the U.S. and overseas returns then describe the relationship between U.S. and overseas returns in words, using r to make your description more precise.

(b) Find the regression line of overseas returns on U.S. returns. Please interpret the values of the slope and of the intercept of this line.

(c) (continued from above) In 1993, the return on U.S. stocks was 10.1%, what was the predicted return on overseas stocks. Is the predicted return the same as the actual return? If it is the same, please explain why this is so. If it is different, please explain why they are different.

- 4. A study of the effects of running on mood involved 321 adult male runners who each ran an average of 20 miles per week. The runners were given a psychological test to measure their levels of happiness, sadness, anger, etc. A newspaper article stated, "The researchers found statistically significant mood differences between the runners and the adult male population as a whole." The headline on the article was "RESEARCH SHOWS THAT RUNNING CAN ALTER MOOD."
- (a) Your best friend has not taken any statistics courses and knows nothing about statistics. Please tell me how you would explain to him or her what "statistically significant" means.

(b) Please also tell me how you would explain to your friend why the headline is misleading.

5. You got a job working for a marketing company and your supervisor is planning a sample survey of households in Los Angeles. Your supervisor instructs you to contact households by random-digit dialing phone numbers. Your supervisor knows from past experience that about 70% of the households you contact in this manner will respond.

(a) If you randomly dial 1500 telephone numbers, what are the mean and standard error of the number of households who respond?

(b) Find the probability that you will get at least 1000 responses.

6. A psychologist has a theory about what kinds of situations people find pleasant or unpleasant. To test his theory, he made up 100 questions of the following kind:

Suppose you like John, you like dogs and John likes dogs. How pleasant is this situation?

For each question, the subject is asked whether he or she likes some person (e.g. John) and then some object, and if so, whether the person likes the object as well. The psychologist presents the 100 questions to a volunteer subject, one question at a time. After each question, the subject rates the pleasantness of the situation on a scale of 1 to 5, with a 1=unpleasant, a 3 = neutral, and a 5 = pleasant. The average of the ratings is 4.2 with a standard deviation of 0.3.

For the two questions below, first indicate whether the statement is true or false. Then explain your reasoning. If you need more information to decide whether it is true or false, say what you need and why you would need it to answer the question.

(a) An approximate 95% confidence interval for a subject's long-run average response to this kind of questioning is in the interval from 3.6 to 4.8.

(b) Approximately 68% of the questions had responses in the range 4.2 ± 0.3

7. You are planning to perform a significance test of

 H_0 : mean = 0

Versus

 H_1 : mean < 0

What values of Z would lead you to reject H_0 at the 1% level of significance? Then answer this question: True or False and explain why. A significance test that is significant at the 1% level of significance must always be significant at the 5% level of significance. 8. A study gives the following results for the law school admissions test (LSAT) and undergraduate GPA (grade point average):

Average GPA:3.3;Standard deviation= 0.4Average LSAT:150;Standard deviation= 10Correlation coefficient = 0.6

(a) Suppose one particular student has a GPA of 3.4, can you predict what this person got on the LSAT? Answer True or False and justify your answer.

(b) Suppose a group of students all have GPA's of 3.4, can you predict what their average LSAT score will be? Answer True or False and justify your answer.