

NAME: _____

Math 124 FALL 2004: Section 7 TTh 9:35-10:50 AM

Midterm 2

Date: Apr 28, 2005

Instructions: Answer questions 1-4. There is a bonus question, but you can get a perfect score without attempting it. Show as much work as you feel reasonable. You have 75 minutes. To allow others to fully concentrate at the end please do not leave in the last 5 minutes. You should submit your page of notes with your test paper.

Question 1. (25 points)

Define each of these terms in the context of sample surveys. Where appropriate explain the possible effect (of the term) on conclusions drawn from a survey.

(a.) *Population and Sample*

(b.) *Simple Random Sample*

(c.) *Stratified Random Sample*

(d.) *Voluntary Response*

(e.) *Question Wording*

Question 2. (*25 points*)

An education researcher at SFSU wants to investigate study habits of Freshmen students at SFSU. She gathers a list of all the Freshmen students at SFSU. Her research unit has the time and resources to deal with responses from as many as 250 students.

(a). What is the population in this study? What is the sample?

(b). Suggest a method she could use to select Freshmen students for her study. Explain why you recommend this method.

(c). What issues should the researcher consider when creating this questionnaire?

(d). The researcher has two different options on how she can carry out the study: face to face personal interviews or self-administered questionnaires which can be mailed back. Discuss potential advantages and disadvantages for each of these methods.

Question 3. (*25 points*)

The life time of a particular brand of automobile tire is known to be normally distributed with mean 35000 miles and standard deviation 5250 miles. Suppose the manufacturer offers a warranty that guarantees free replacement if a tire does not last at least 20000 miles.

(a.) What is the probability that a tire lasts between 25000 and 42000 miles?

(b.) What is the probability that a tire will not need warranty replacement?

(c.) Above how many miles will the top 2% of tires of this brand last?

Question 4. (*25 points*)

Suppose that bolts are produced in a factory. The probability of a bolt being defective (outside acceptable specifications) is .01. Each bolt is produced independently of all other bolts.

(a.) What is the probability that there is one or more defective bolts in a batch of size 10?

(b.) Suppose that there are instead 2000 bolts in a batch. What is the mean number of defective bolts in a batch of this size? What is the standard deviation?

(c.) What is the probability of having more than 30 defective bolts in a batch of 2000?

Non-compulsory bonus question. (*up to 10 points*)

Discuss the differences between association and causation. Be sure to indicate which types of studies would lead you to which sort of conclusions and any potential problems that arise.