Math 3342 Exam II August 1, 2001

Answer the problems on separate paper. You do not need to rewrite the problem statements on your answer sheets. Do your own work. Show all relevant steps which lead to your solutions. Retain this question sheet for your records.

1. A random variable has a normal distribution with $\mu = 64.2$. Find its standard deviation if the probability is 0.07 that it will take on a value greater than 72.9.

2. A bookstore has 14 copies of a rare book of which 6 have missing pages. A librarian purchases 5 copies of the book, selecting them at random. What is the probability that among the 5 purchased books that two or more of them have missing pages?

3. Suppose that drilling an oil well costs \$10 million. If the well is dry, the firm loses \$10 million. If the firm strikes oil, the net profit is \$100 million. Suppose further that the probability of striking oil is 0.2. If the firm starts out with \$30 million, what is the probability that the firm will not be bankrupt after drilling 3 wells.

4. Fly-South Airlines flies daily between Chicago and Montevideo. The flight duration is a random variable with a normal distribution with a mean of 10 hours and a standard deviation of 30 minutes. What is the probability that a given flight will arrive not more than 10 minutes early and not more than 45 minutes late?

5. If 10 percent of all business executives fill out a given marketing survey questionnaire, what is the probability of getting at least 25 questionnaires back from 200 distributed to executives?

6. A sales representative for a tire manufacturer claims that the company's steel-belted radials get at least 45,000 miles. A tire dealer decided to check this claim by testing eight tires. If 75% or more of the eight tires get at least 45,000 miles, he will purchase tires from the sales representative. If, in fact, 85% of the steel-belted radials produced by the manufacturer do get at least 45,000 miles, what is the probability that the tire dealer will purchase tires from the sales representative?

7. The number of radon emissions from a controlled experiment is a Poisson process with an average of 4 per 10 minute interval. If more than 5 occur over a 5 minute interval, the experiment will be halted by a computer program monitoring the experiment. What is the probability that the computer program will interupt the experiment?

8. The probability that a tornado will strike a given area during a given year is 0.03. What is the probability that at least one tornado will strike over a thirty-year period?

9. According to the Department of Health and Human Services, the probability that a person aged 70 will live to be at least 75 is 85%. Suppose that 500 people aged 70 are selected at random. Find the probability that more than 435 of them will be alive at age 75.

10. A packaging machine fills 5 lbs flour bags. If the filled weight of a randomly selected bag falls below 4.98 lbs, the machine has to be recalibrated. The filled weights of the flour bags form a normal distrubtion with mean 5.06 lbs and standard deviation 0.03 lbs. What is probability that machine will have to be recalibrated after the random selection of a flour bag for quality control assessment?