Chapter 12 - The Normal Probability Model

45. An insurance company found that 2.5% of male drivers between the ages of 18 and 25 are involved in serious accidents annually. To simplify the analysis, assume that every such accident costs the insurance company $65,000 and that a driver can only have one of these accidents in a year.

- (a) If the company charges $2,500 for such coverage, what is the chance that it loses money on a single policy?

- (b) Suppose that the company writes 1,000 such policies to a collection of drivers. What is the probability that the company loses money on these policies? Assume that the drivers don't run into each other and behave independently.

- (c) Does the difference between the probabilities of parts (a) and (b) explain how insurance companies stay in business? Large auto insurers are certainly profitable.

47. A hurricane bond pays the holder a face amount, say $1 million, if a hurricane causes major damage in the United States. Suppose that the chance for such a storm is 5% per year.

- (a) If a financial firm sells these bonds for $60,000, what is the chance that the firm loses money if it only sells one of these?

- (b) If the firm sells 1,000 of these policies, each for $60,000, what is the probability that it loses money?

- (c) How does the difference between the probabilities of parts (a) and (b) compare to the situation of a life insurance company that writes coverage to numerous patients that live or die independently of one another?

49. Pharma Promotion The data give the market share (0 to 100%) of a brand-name pharmaceutical product in 224 metropolitan locations. The market share indicates the percentage of all prescriptions for this type of medication that are written for this brand.

- (a) Describe the histogram and boxplot of the market shares. Is the histogram symmetric and unimodal? Would you say that this histogram is bell shaped?

- (b) Are there any outliers? In what location does this brand have the highest market share? The lowest?

- (c) The market share can only be as large as 100 and cannot be negative. Since a normal model allows for any value, is it possible for a normal model to describe these shares? Would a normal model be reasonable if the average share were closer to 0 or 100%?

- (d) What normal model describes the distribution of returns of these shares?

- (e) Is the normal model in part (d) a good description of these shares? Explain how you decided whether it's a good match or not.