(1) An extremely large shipment of parts is known to contain 2.4% defective parts. Suppose that 4,000 parts are randomly selected from the shipment. **According to Chebyshev's theorem**, there is at least a 90.5325444% chance that the number of defective parts obtained will be between what two values?

(2) You have decided to invest $80,000 in the stock market. Under consideration are two stocks. Although you obviously are interested in obtaining a high rate of return, consideration is also given to the risk involved with the stocks. A risk index of 1-10 (with 10 being the most risky) is assigned to each of the two stocks. The total risk of the portfolio is found by multiplying the risk of each stock by the dollars invested in each stock.

Stock 1: Estimated Return= 10%, Risk Index= 8
Stock 2: Estimated Return= 6%, Risk Index= 3

You would like to maximize the return, but the average risk index must not be higher than 5.

Use the corner point method to determine how much money you will invest in each of the two stocks.

(3) A food distributor currently employs one worker whose job is to load outgoing company trucks. Trucks arrive at the loading gate at an average rate of 2.4 per hour, according to a **Poisson** distribution. The worker loads the trucks at an average rate of 4 per hour, according to an **exponential** distribution.

(a) What is the average number of trucks waiting to be loaded at any point in time?
(b) What is the average number of seconds a truck spends in the loading system?
(c) Suppose that two new workers are added, each of whom works at the same rate as the first worker. With the group of three workers, what is the average number of minutes a truck waits in line before it begins to be loaded?

(4) Project costs for your construction company are **normally distributed**, with a mean of $3,620,000. 43% of the projects cost less than $2,960,000. Only 4.1% of the projects cost less than the one on which you are currently working. What is the cost of the project on which you are currently working?

(5) Consider a market consisting of three competitors. The market shares in period 1 are as follows: Company 1=60%, Company 2=15%, Company 3=25%. From period to period, Company 1 loses 5% of its customers to Company 2 and 10% of its customers to Company 3.

From period to period, Company 2 loses 10% of its customers to Company 1 and 5% of its customers to Company 3. From period to period, Company 3 loses 20% of its customers to Company 1 and 8% of its customers to Company 2.

(a) What are the long run equilibrium market shares?

(b) What are the market shares in period 3?

(6) Schwarzler Airlines has three late night flights out of LaGuardia. 10, 4, and 8 percent of the passengers on the Atlanta, Kansas City, and Detroit flights, respectively, get bumped from their flights. Furthermore, 45, 25, and 30 percent of the late-night Schwarzler passengers at LaGuardia take the Atlanta, Kansas City, and Detroit flights, respectively. A late-night Schwarzler passenger chosen at random was not bumped from a scheduled flight. What is the probability this passenger was taking a Kansas City flight?

(7) A corporation administers an aptitude test to all new sales representatives. Here is pertinent data for a sample of sales representatives:

Weekly Sales ($1,000)	10	12	28	24	18	16	22
Test Score	55	60	85	75	80	85	70

Regression results are as follows: R Squared=.69, Standard Error of Estimate=5.16, Standard Error of Intercept=13.10, Standard Error of Slope=.18

Is there strong evidence that the slope of the relationship between weekly sales and test score is less than .5? Test at the .01 level.

(8) Monthly mortgage payments made by a population of homeowners have a **non-normal** distribution, with a mean of $1,920 and a standard deviation of $512. We take a sample of 71 monthly mortgage payments. There is a 65% chance that the sample mean is greater than how many dollars?

(9) During the late afternoon on weekdays, vehicles arrive at a service station at the average rate of .8 every 36 seconds. Consider a 10.5 minute period during the late afternoon on a weekday. Assuming a **Poisson** distribution, what is the probability that at least 20 vehicles arrive?

(10) In a production process, an adjustment to the machinery is unnecessary if more than 86% of the items meet a particular specification. We take a sample of 500 items. 440 of them meet the specification. At the .003 level of significance, do we have strong evidence that an adjustment to the machinery is unnecessary?