1. Let X and Y be a couple of random variables with joint pdf

$$f(x,y) = c \ , \ 0 < x < 1 \ , \ x^2 < y < 1$$

   Find the value of the constant c.

2. Refer to question 1, find $E(X)$.

3. Lori just bought a new set of 4 tires for her car. The life of each tire is normally distributed with a mean of 45000 miles and a standard deviation of 3200 miles. Find the probability that all 4 tires will last at least 46000 miles. Assume the life of each of these tires is independent of the lives of other tires.

4. A television store owner figures that 45 percent of the customers entering his store will purchase on ordinary television set, 15 percent will purchase a plasma television set, and 40 percent will just be browsing. If 5 customers enter his store on a given day, what is the probability that he will sell exactly 2 ordinary sets and 1 plasma set on that day ?

5. A study found that 80% of students are too young to vote. Find the probability that at least 175 students can vote in a random sample of 800 students.

6. Suppose that in a community the distributions of heights of men and women (in centimeters) are $\mathcal{N}(173, 40)$ and $\mathcal{N}(160, 20)$, respectively. Calculate the probability that the average height of 10 randomly selected men is at least 5 centimeters larger than the average height of six randomly selected women.

7. Let (X, Y) be a couple of random variables with joint pdf

$$f(x,y) = e^{-(x+y)} \ , x > 0 \ , y > 0$$

   Let $U = X + Y$ and $V = X/Y$.

   a. Find the joint pdf of the couple (U, V).

   b. Find the marginal pdf of U and V.

8. Otto is trying out for the javelin throw to compete in the olympics. The lengths of his javelin throws is normally distributed with a mean of 290 feet and a standard deviation of 10 feet. Find the probability that the longest of three of his throws is 320 feet or more.

9. The time it takes for a student to finish an aptitude test (in hours) has the pdf

$$f(x) = 6(x - 1)(2 - x) \ , \ 1 < x < 2$$

   Approximate the probability that the average length of time it takes for a random sample of 15 students to complete the test is less than 1 hour and 25 minutes.