1. The probability is p that a randomly chosen light bulb is defective. We screw a bulb into a lamp and switch on the current. If the bulb works, we stop; otherwise, we try another and continue until a good bulb is found. What is the probability that at least n bulbs are required ?

2. The running time of the 100-meter sprint is uniformly distributed between 9.7 and 11.2 seconds. Find the probability that Ed finishes the 100-meter sprint in less than 10 seconds.

3. Refer to question **??**, if 8 runners participate to the 100-meter sprint, what is the probability that exactly three of them finish the race in less than 10 seconds ?

4. Suppose that X takes on one of the values $0, 1, 2$. If for some constant c, $P(X = i) = cP(X = i-1)$, $i = 1, 2$, find $Var(X)$ in terms of c.

5. Let X be a uniform random variable over the interval $(0, 1)$. Calculate $E(-\ln X)$.

6. Lat X be an exponential random variable with $P(X < 50) = 0.25$. Find $P(X > 100 | X > 50)$.

7. Five balls are selected at random and without replacement from an urn containing 15 balls numbered 1 through 15. Let Y be the largest number selected. Find the pdf of Y.

8. Let Y be a random variable with mgf

$$M(t) = \frac{e^{5t}}{(3 - 2e^t)^5}$$

Find $P(Y = 12)$.

9. The time that it takes for a statistics student to answer all the questions on a certain exam is an exponential random variable with mean 1 hour and 15 minutes. If all 10 students of a statistics class are taking that exam, what is the expected number of students that would finish the exam in less than one hour ?

10. A certain typing agency employs two typists. The average number of errors per article is 3 when typed by the first typist and 5 when typed by the second typist. An article is equally likely to be typed by either typist. Find the probability that the article was typed by typist one if the article contains one error.

11. The random variable X is called double exponentially distributed if its density function is given by

$$f(x) = c\,e^{-|x|} \ , \quad -\infty < x < +\infty$$

- Find the value of c.

- Find $P(-1 < X < \frac{1}{2})$

12. Each game you play is a win with probability $\frac{1}{3}$. You plan to play 5 games; but if you win the fifth game then you will keep playing until you lose, and if you lose the fifth game then you play five more games then you stop. Find the expected number of games that you lose.