01) Expressway operation maintenance and management division introduced an emergency call system for the passengers who use the highway to get help in case of emergency. Let X be the number of messages received by the expressway emergency call system per hour. The number of messages received per hour varies from 10 to 15 with the following probabilities.

x	10	11	12	13	14	15
P (X = x)	0.08	0.15	0.1	k	0.1	0.07

a) Find the value of k.
b) Determine the Cumulative distribution function of X.
c) Calculate the Mean and Standard deviation of the number of messages received per hour.
d) Express P (11.5 ≤ X ≤13.5) in terms of $F_X(x)$ which you defined in (b).
e) Calculate P (11.5 ≤ X ≤ 13.5) using the result you obtained for (d).

02) For the following random samples, find the maximum likelihood estimate of θ:
$Y_i \sim Binomial(3, \theta)$ and we have observed (y_1, y_2, y_3, y_4) = (1,3,2,2).

03) A sample of the various prices for a particular product has been conducted in 16 stores which were selected at random in a neighborhood of a city. The following prices were noted. 95, 108, 97, 112, 99,106, 105, 100, 99, 98, 104,110, 107, 111, 103, 110 Assuming that the prices of this product follow a normal law of variance of 25 and unknown mean.
   a) What is the sample mean?
   b) Determine the confidence interval at 95% for the population mean?

04) Suppose that Y is a discrete random variable with the following probability mass function: where $0 \leq \theta \leq 1$ is parameter. The following 10 independent observations.

Y	P(Y)
0	$2\theta/3$
1	$\theta/3$
2	$2(1-\theta)/3$
3	$(1-\theta)/3$

Were taken from such distribution: (3, 0, 2, 1, 3, 2, 1, 0, 2, 1). Using the method of moment find the estimate of θ.