Central University of Rajasthan

Department of Statistics

STA 202 Practical No.: 1

Name: PMF sketch of Discrete Distributions

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1. Plot probability mass function of uniform distribution over
   a. {0, 1, …,10}
   b. {11, 12, …,30}
2. Plot probability mass function of binomial with
   a. $n = 6$ and $p = 0.2, 0.5,$ and 0.8
   b. $n = 10$ and $p = 0.1, 0.5,$ and 0.9
3. Plot probability mass function of Poisson for $\lambda = 1, 3,$ and 6
4. Plot probability mass function of geometric with $p = 0.1, 0.5,$ and 0.8
5. Plot probability mass function of negative binomial with
   a. $r = 3$ and $p = 0.2, 0.5,$ and 0.8
   b. $r = 5$ and $p = 0.2, 0.5,$ and 0.8
6. Plot probability mass function of hypergeometric with $(N = 30,\ M = 10,\ n = 6)$

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STA 202 Practical No.: 2

Name: PDF sketch of Continuous Distributions

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1. Plot probability density function of Rectangular distribution over [-1, 1]
2. Plot probability density function of Exponential with $\lambda = 0.5,\ 2,$ and 5 in one plot.
3. Plot probability density function of Normal with
   a. $\mu = 1\ and\ \sigma = 1$
   b. $\mu = 1\ and\ \sigma = 0.5$
   c. $\mu = 1\ and\ \sigma = 2$
   d. $\mu = 1.5\ \ and\ \sigma = 1$
   e. $\mu = 1.5\ and\ \sigma = 1.5$

   in same one plot.

4. Plot probability density function of Gamma with
   a. $\alpha = 1$ and $\beta = 1$
   b. $\alpha = 2$ and $\beta = 1$
   c. $\alpha = 1$ and $\beta = 2$
   d. $\alpha = 2$ and $\beta = 2$

   in same plot (where α and β are respectively shape and scale parameters).

5. Plot probability density function of Beta distribution of first kind with
   a. $\alpha = \beta = 0.5$
   b. $\alpha = 5$ and $\beta = 1$
   c. $\alpha = 1$ and $\beta = 3$
   d. $\alpha = 2$ and $\beta = 5$

   in same plot.

6. Plot probability density function of Beta distribution of second kind with
   a. $\alpha = \beta = 1$
   b. $\alpha = 5$ and $\beta = 1$
   c. $\alpha = 1$ and $\beta = 3$
   d. $\alpha = 2$ and $\beta = 5$

   in same plot.

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STA 202 Practical No.: 3

Name: Computation of probabilities based on area property of normal distribution.

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1. A certain company manufactures artificial starter logs for fireplaces. These logs are accepted by the buyer if they fall within the tolerance limits of 0.695 inches and 0.780 inches in length. Assuming that the length of the logs is normally distributed with a mean of 0.72 inches and a standard deviation of 0.03 inches, estimate the percentage of logs that will be rejected by the buyer.

2. At a certain hospital, the weight of infants is normally distributed with a mean of 7.5 lbs and a standard deviation of 1.1 lbs.
   a) What is the probability that a randomly selected infant at this hospital weighs more than 8 lbs?
   b) What is the probability that a randomly selected infant at this hospital weighs exactly 7.5 lbs?
   c) Only 1% of all infants at this hospital weigh less than _____ lbs.
   d) 25% of all infants at this hospital weigh more than _____ lbs.
   e) If you randomly access records of 1000 infants at this hospital, how many of those infants would you expect to weigh more than 9 lbs?

3. An instructor gave an exam to his class that had an average of 65 and standard deviation of 13. He decided to assign grades as follows: the top 6% and the bottom 6% will receive A's and F's, respectively. The next 16% in either direction will be given B's and D's, and the remaining students will receive C's. Assuming that the grades on the exam are normally distributed, find the cutoffs for each grade level.

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STA 202 Practical No.: 4

Name: Fitting of distributions: Binomial, Poisson, Normal distributions.

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1. Following data represent the number of germinating seeds among 10 seeds on damp filter paper for 80 sets of seeds. Fit a Binomial distribution. Compute expected frequencies. Plot expected frequencies against observed frequencies and comment on adequacy of the binomial model. Carryout the Chi-square goodness of fit test.

x	0	1	2	3	4	5	6	7	8	9	10
Frequency	6	20	28	12	8	6	0	0	0	0	0

2. Fit a Poisson distribution to the following data and estimate expected frequencies. Plot expected frequencies versus observed frequencies to judge adequacy of the model. Carryout the Chi-square goodness of fit test.

No. of misprints	0	1	2	3	4	5
No. of pages	139	76	28	4	2	1

3. Following is the frequency distribution of heights of trees in a locality. Fit a normal distribution to the data and estimate expected frequencies. Plot expected frequencies versus observed frequencies to judge adequacy of the model. Carryout the Chi-square goodness of fit test.

C.I.	13.20-20.90	20.90-28.60	28.60-36.30	36.30-44.00	44.00-51.70	51.70-59.40	59.40-67.10	67.10-74.80	74.80-82.50	82.50-90.20
f	2	10	16	37	43	39	29	13	6	5

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STA 202 Practical No.: 5

Name: Simulation of data from discrete distributions

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1. Generate 1000 random numbers from following distributions using inbuilt commands in R
   a) DU(N=50)
   b) B(10, 0.6)
   c) P(4)
   d) G(0.4)
   e) NB(r=6, p=0.8)
   f) HG (N=30,M=10,n=6)
      i. Using generated sample obtain sample mean and variance.
      ii. Compare sample mean and variance with theoretical mean and variance.

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STA 202 Practical No.: 6

Name: Simulation of data from continuous distributions

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1. Generate 1000 random numbers from following distributions using inbuilt commands in R
   g) Rectangular(-5, 5)
   h) Exponential(3)
   i) Normal(7, 3)
   j) Gamma(3, 6)
   k) Beta-I (a=6, b=2)
   l) Beta-I (a=3, b=9)
   iii. Using generated sample obtain sample mean and variance.
   iv. Compare sample mean and variance with theoretical mean and variance.