

Department of Mathematics-University of Ruhuna
Bachelor of Science (Special) Degree (Level II)-Semester I
Mathematics

MST 4053 Statistics Laboratory

Assignment No: 03

12/02/2010

1. The file **prob.R** contains function that may be used to graph and visualize the binomial and normal distributions.

i)

- a) Plot the binomial distribution with $n = 20$ and $p = 0.3$.
- b) Visualize the probability of getting between 45 and 55 heads in 100 coin tosses.
- c) Find the single probability of exactly 10 successes in 100 trials with $p = 0.1$.
- d) Find 90th percentile of a binomial distribution with $n = 200$ and $p = 0.3$ and visualize the distribution.
- e) Obtain random sample of 20 binomial random variables from a binomial distribution with $n=10$ and $p=0.5$.

ii)

- a) Heights of individual corn plants may be modeled as normally distributed with a mean of 145 cm and a standard deviation of 22 cm. Find proportion of plants larger than 100 cm. Visualize the answer.
 - b) Find proportion between 120 cm and 150 cm and visualize the answer.
 - c) Find the proportion 150 cm or less and visualize the answer.
 - d) Find 75th percentile and visualize it.
 - e) Find end points of middle 95% of the distribution and visualize it.
- (Hint : download above file and save it your working derectory)

2. Simulate 18 rolls of a fair die. Ideally, we would expect each of the six possible integers to turn up three times in an 18 rolls. Determine the frequency of occurrence of each possible outcome. Next, simulate 18,000

rolls of a fair die and determine the frequency of occurrence of each possible outcome. What do these results illustrate?

3. Suppose a field-goal kicker has an 80% success rate inside the 35-yard line. Simulate eight field-goal kicks inside the 35-yard line during a game. Determine the number of successes. Simulate eight kicks inside the 35 for ten consecutive games. Determine his success rate in each game and his success rate for the ten-game season.
-

4. Suppose we randomly select six homes in *Nuwara-Eliya* and determine whether they heat with gas. The number of successes (heat with gas) out of the six homes is a binomial random variable with $n = 6$ and $\pi = 0.5$. Simulate the experiment 60 times and summarize the results.
-

5. Simulate 2000 rolls of a fair die and determine the frequency of the occurrence of each possible outcome. Based on the simulation, what is the probability of rolling a 3? Would you say that the possibilities are equally likely? What is the probability that it turns up odd and greater than 4?
-

6. Suppose 68% of all requests for financial aid are approved by a university. Determine the probabilities associated with the number of approvals being 7, 8, 9, 10, 11 and 12 out of 20 requests.
-

7. Assuming the mean IQ is 100 and the standard deviation is 16.
 - a) Simulate 80 IQs.
 - b) Construct a histogram of the results.
 - c) Does the histogram resemble a normal distribution?
 - d) Construct the normal probability plot.
 - e) Generate *Normal*, *Chi Square*, *Beta* and *Uniformly* distributed data and Obtain box plot & normal probability plot to see behavior of these distribution with sample size.