

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

MST 4053 Statistics Laboratory

Assignment No: 04

19/02/2010

1. Consider following case.

- a) Waiting time of a person at a traffic light is uniformly distributed on $[0,2]$.
 - (i) Generate the waiting time of that person at five traffic lights.
 - (ii) Generate 100 random numbers of above distribution and draw histogram and density curve.
 - b) Marks of a IQ exam may be normally distributed with mean 100 and standard deviation 16.
 - (i) Generate marks of a particular student.
 - (ii) Generate marks of 100 students draw histogram and density curve.
 - c) Consider Bernoulli distribution with $p=0.5$.
 - (i) Generate single Bernoulli trail.
 - (ii) Generate 10 Bernoulli trails.
 - d) Consider Binomial distribution with $n=10$ and $p=0.5$.
 - (i) Generate single trail.
 - (ii) Generate 10 trails.
 - e) Mean lifetime of a light bulb is exponentially distributed with mean 2500.
 - (i) Generate lifetime of a bulb.
 - (ii) Generate lifetime 100 such bulb and draw histogram and density curve.
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2. Simulate 2000 random samples of the size 16 from a normally distributed population with a mean of 30 and standard deviation of 8.

- (i) Determine the sample means of each of the 2000 samples.
- (ii) Construct a histogram with normal curve of the 2000 sample means. Does it appear to be normally distributed?

- (iii) Construct a normal probability plot of the 2000 sample means. Is normally plausible?
 - (iv) Compute descriptive statistics for the 2000 sample means.
 - (v) What is the mean of the 2000 sample mean $\bar{x}$? Is it close to the population mean?
 - (vi) What is the standard deviation of the 2000 sample means? Is it close to the population standard deviation?
 - (vii) Repeat the process for samples of size 64.
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3. Simulate 2000 realizations of p when $\pi = 0.2$ and $n = 50, 100, 200$.

- (i) Determine the sample means of each of the 2000 samples.
 - (ii) Construct a histogram with normal curve for each of the sampling means. Does it appear to be normally distributed?
 - (iii) Draw box plot for each sampling means in one diagram.
 - (iv) Discuss your results in question (iii).
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4. The exponential distribution is a skewed–right distribution that is often used model lifetimes. Or waiting times. It has a single parameter. Which is the reciprocal of the mean. That is, if the parameter is $\frac{1}{2}$, the mean is 2. Simulate 2000 random sample of size 16 from an exponential distribution with a mean of 5.

- (i) Determine the sample means of each of the 2000 samples.
- (ii) Construct a histogram with normal curve for each of the sampling means. Does it appear to be normally distributed?
- (iii) Construct a normal probability plot of the 2000 sample means. Is normally plausible?
- (iv) Compute descriptive statistics for the 2000 sample means.
- (v) What is the mean of the 2000 sample means? Is it close to the population mean?
- (vi) Repeat the process for sample of size 64.