Project

Sunday, November 23, 2014

Lambda = 0.2, 40 samples, 2000 trials

library(ggplot2) set.seed(314159)
lambda <- 0.2; number.samples <- 40; nosim <- 2000 means <- apply(matrix(rexp(number.samples*nosim, lambda) , nosim), 1, mean) mean.of.sample.means <- mean(means) theoretical.mean <- 1/lambda variance.of.sample.means <- var(means) theoretical.variance <- (1/(number.samples*lambda**2)) g <- ggplot(data = data.frame(means), aes(x = means)) + + geom_histogram(aes(y = ..density..), binwidth= 0.1, fill= 'lightblue', colour='black') + + geom_density(colour = "blue")+ stat_function(fun = dnorm, colour = "red", size = 1, + args = list(mean = 5,sd = 1/(lambda)*(1/sqrt(number.samples)))) g + xlab("Means") + + ylab("") + + ggtitle("Means of Samples from Exponential Distribution") +
+ annotate("text", x = c(7.4,7.5), y = c(0.5,0.55), size = 3, + label = c("Uniform Density", "Density of samples")) + + annotate("segment", x = c(6.2,6.2), xend = c(6.4,6.4), y = c(0.5,0.55), + yend = c(0.5,0.55),colour = c("red", "blue")) shapiro <- as.character(shapiro.test(means)$p.value)

Lambda 0.1 to 100.0, 40 samples, 2000 trials

Lambda.Value <- seq(0.1, 100.0, by = .25);

Coverage <- sapply(Lambda.Value, function(lambda){ + runs <- matrix(rexp(number.samples*nosim,lambda) , nosim)
+ lhats <- apply(runs , 1, mean) + lsd <- apply(runs,1,sd) + ll <- lhats - qnorm(.975) lsd /sqrt(number.samples) + ul <- lhats + qnorm(.975) * lsd /sqrt(number.samples) + mean(ll < 1/lambda & ul > 1/lambda) }) ggplot(data.frame(Lambda.Value, Coverage), aes(x = Lambda.Value, y = Coverage)) + geom_line(size = .25) + geom_hline(yintercept = 0.95) + geom_hline(yintercept = 0.925, colour='navy', linetype=2)+ ylim(.85, 1.0) + xlab("Lambda") +
ggtitle("Coverage of 95% intervals")

Coverage: about 92.5% for the 95% intervals for sample sizes of 40.

The value of Lambda does not seem to affect the coverage.