

MLE_program1

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#install.packages("scatterplot3d") # Install

#Likelihood for a geom(p) RS is
likelihood <- function(p, sumy, n){
  ((p/(1-p))^n)*(1-p)^sumy
}

#logLikelihood for geom(p) RS is
loglikelihood <- function(p, sumy, n){
  n*log(p)-n*log(1-p)+sumy*log(1-p)
}

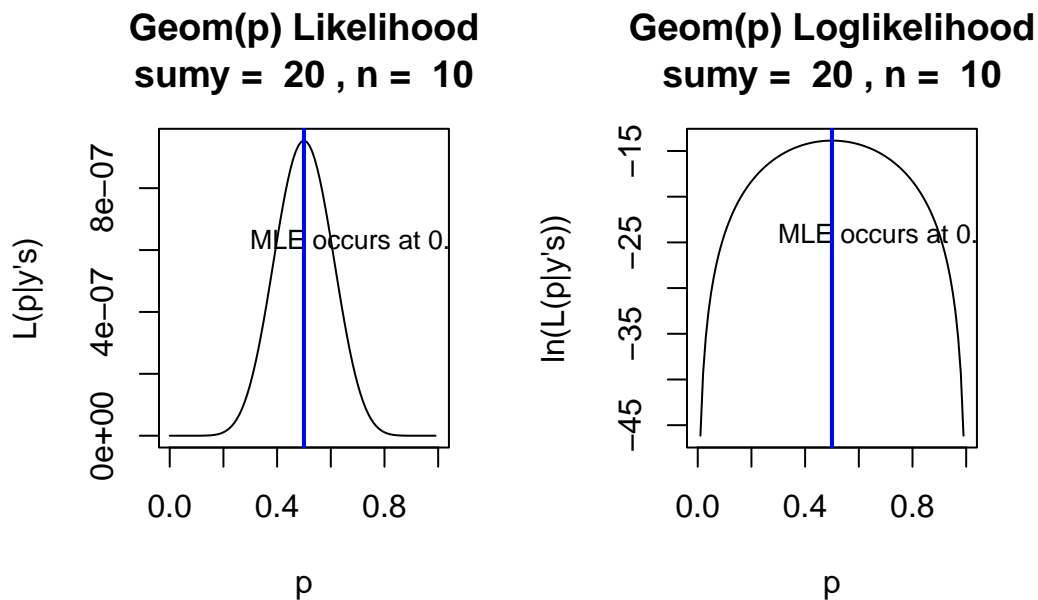
#Create plots for likelihood and loglikelihood for some different values of sumy
par(mfrow=c(1,2))

#create plots
sumy <- 20
n <- 10
curve(likelihood(p, sumy = sumy, n = n),
      xname = "p",
      main = paste("Geom(p) Likelihood\nsumy = ",sumy," n = ",n),
      ylab = "L(p|y's)",
      from = 0,
      to = 1)
abline(v = 1/(sumy/n),
       lwd = 2,
       col = "blue")
text(x = 0.7,
     y = likelihood(0.6, sumy, n),
     paste0("MLE occurs at ", signif(n/sumy, 4)),
     cex = 0.8
    )
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curve(loglikelihood(p, sumy = sumy, n = n),
      xname = "p",
      main = paste("Geom(p) Loglikelihood\nsumy = ",sumy," , n = ",n),
      ylab = "ln(L(p|y's))",
      from = 0, to = 1)
abline(v = 1/(sumy/n),
       lwd = 2,
       col = "blue")
text(x = 0.7,
     y = loglikelihood(0.9, sumy, n),
     paste0("MLE occurs at ", signif(n/sumy,4)),
     cex = 0.8)

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#Create plots for likelihood and loglikelihood for some different values of sumy
par(mfrow=c(1,2))

#create plots
sumy <- 70
n <- 10
curve(likelihood(p, sumy = sumy, n = n),
      xname = "p",
      main = paste("Geom(p) Likelihood\nsumy = ",sumy," , n = ",n),

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      ylab = "L(p|y's)",
      from = 0,
      to = 1)
abline(v = 1/(sumy/n),
      lwd = 2,
      col = "blue")
text(x = 0.53,
     y = likelihood(0.21, sumy, n),
     paste0("MLE occurs at ", signif(n/sumy, 4)))

curve(loglikelihood(p, sumy = sumy, n = n),
      xname = "p",
      main = paste("Geom(p) Loglikelihood\nsumy = ",sumy," , n = ",n),
      ylab = "ln(L(p|y's))",
      from = 0, to = 1)
abline(v = 1/(sumy/n),
      lwd = 2,
      col = "blue")
text(x = 0.5,
     y = loglikelihood(0.9, sumy, n),
     paste0("MLE occurs at ", signif(n/sumy,4)),
     cex = 0.8)

```

