# MLE_Program2

```r
#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 <- 10
n <- 10
curve(loglikelihood(p, sumy = sumy, n = n),
      xname = "p",
      main = paste("Geom(p) Loglikelihood\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 = loglikelihood(0.6, sumy, n),
     paste0("MLE occurs at ", signif(n/sumy, 4)),
     cex = 0.8
)
#create plots
sumy <- 20
n <- 10
curve(loglikelihood(p, sumy = sumy, n = n),
      xname = "p",
      main = paste("Geom(p) Loglikelihood\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 = loglikelihood(0.6, sumy, n),
     paste0("MLE occurs at ", signif(n/sumy, 4)),
     cex = 0.8
)
```
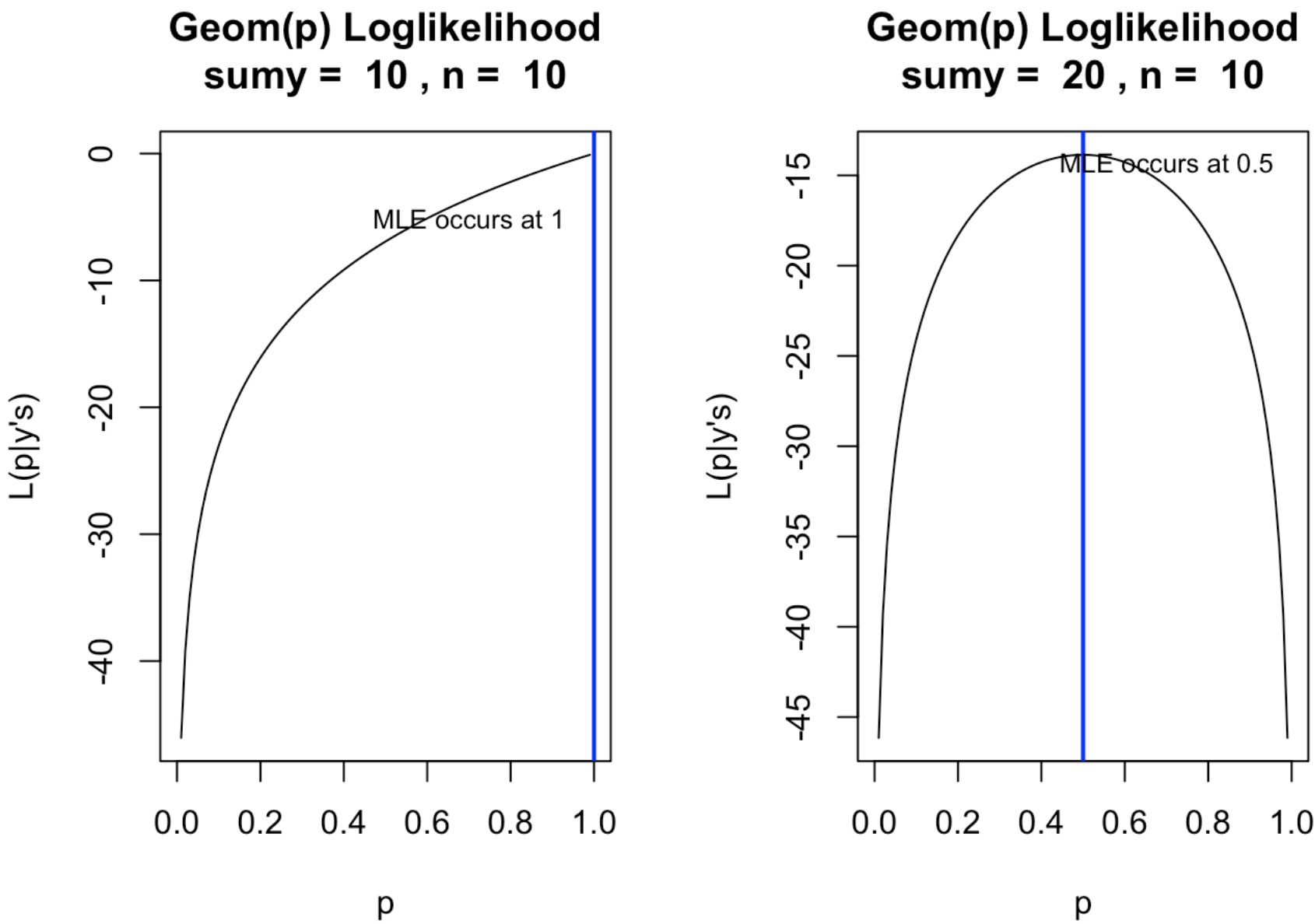


```r
#create plots
sumy <- 30
n <- 10
curve(loglikelihood(p, sumy = sumy, n = n),
      xname = "p",
      main = paste("Geom(p) Loglikelihood\nsumy = ",sumy,", n = ",n),
      ylab = "L(p|y's)",
      from = 0,
      to = 1)
abline(v = 1/(sumy/n),
       lwd = 2,
       col = "blue")
text(x = 0.7,
     y = loglikelihood(0.6, sumy, n),
     paste0("MLE occurs at ", signif(n/sumy, 4)),
     cex = 0.8
)
#create plots
sumy <- 200
n <- 10
curve(loglikelihood(p, sumy = sumy, n = n),
      xname = "p",
      main = paste("Geom(p) Loglikelihood\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 = loglikelihood(0.6, sumy, n),
     paste0("MLE occurs at ", signif(n/sumy, 4)),
     cex = 0.8
)
```