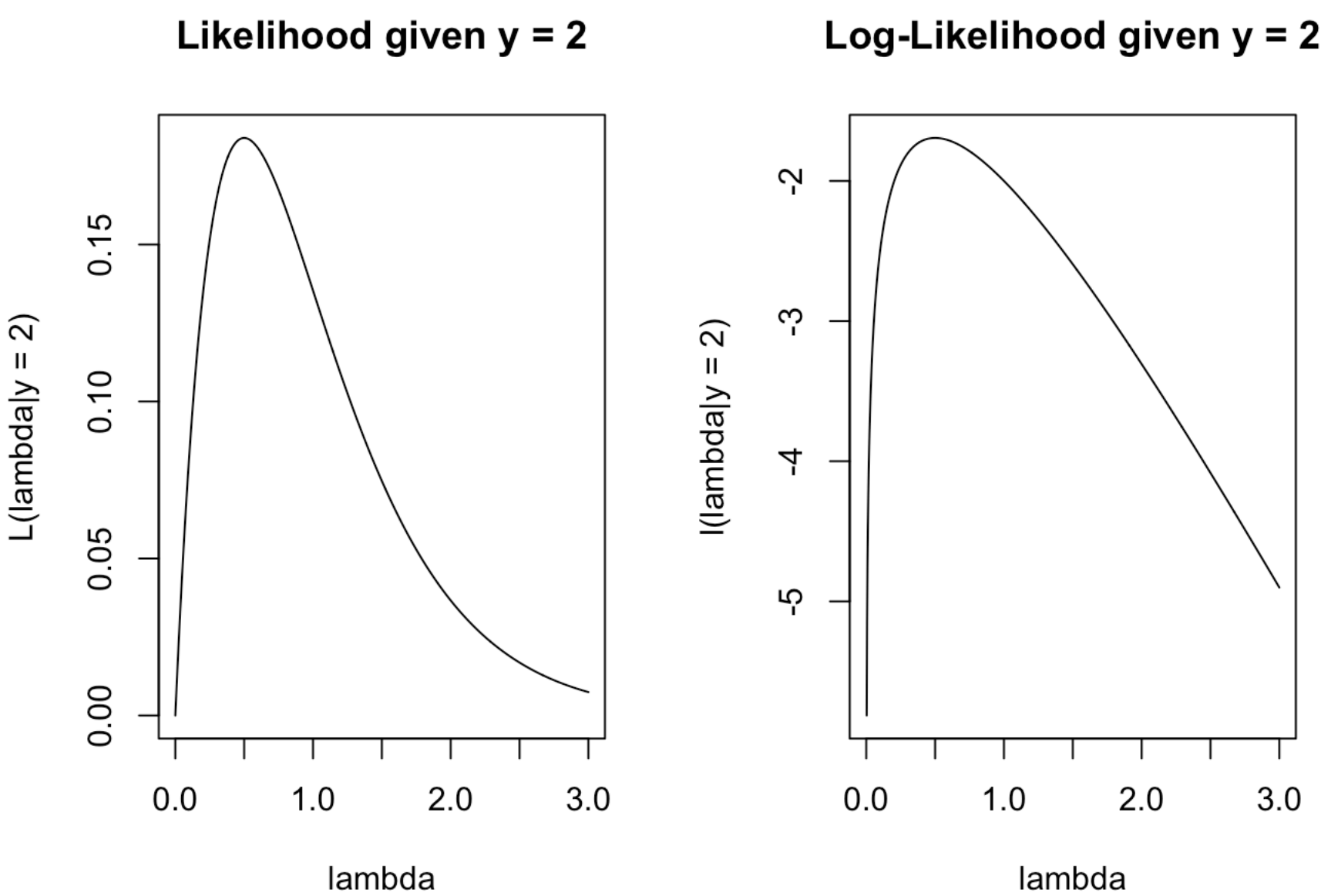


NonParamBootstrap_Program

```
par(mfrow=c(1,2))
curve(lambda*exp(-2*lambda),
      from = 0, to = 3, n = 1000,
      xname = "lambda", ylab = "L(lambda|y = 2)",
      main = "Likelihood given y = 2")
curve(log(lambda*exp(-2*lambda)),
      from = 0, to = 3, n = 1000,
      xname = "lambda", ylab = "l(lambda|y = 2)",
      main = "Log-Likelihood given y = 2")
```

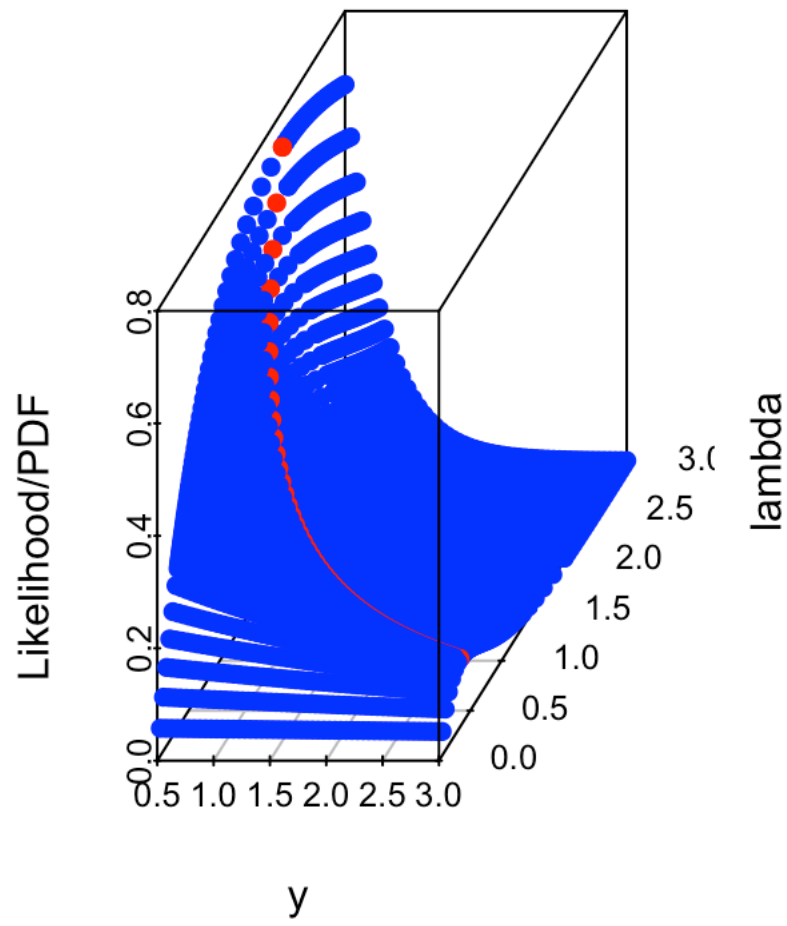


```
#plotting sequences
y <- seq(from = 0.5, to = 3, by = 0.05)
lambda <- c(seq(from = 0.05, to = 1/y[length(y)], by = 0.05),
            1/y,
            seq(from = 1/y[1], to = 3, by = 0.05))
#create density function
fylambda <- function(y, lambda){lambda*exp(-lambda*y)}
#grid of points to plot Likelihood or density over
grid <- expand.grid(lambda, y)
#plotting data
plotData <- data.frame(lambda = grid$Var1,
                       y = grid$Var2,
                       likelihood = fylambda(lambda=grid$Var1,y=grid$Var2))
plotData$color <- ifelse(plotData$lambda == 1/plotData$y, "red", "blue")
#static plot
scatterplot3d::scatterplot3d(y = plotData$lambda,
                             x = plotData$y,
                             z = plotData$likelihood,
                             color = plotData$color,
                             pch = 16, box = TRUE, #highlight.3d = TRUE,
                             type = "p",
                             main = "Likelihood/PDF as a function of both y and lambda\n
                             Maximums for a given y are highlighted in red",
                             angle = 40,
                             ylab = "lambda",
                             xlab = "y",
                             zlab = "Likelihood/PDF")

par(mfrow = c(1,3))
```

Likelihood/PDF as a function of both y and lambda

Maximums for a given y are highlighted in red



```
lambda <- 0.25
y <- seq(from =0.1, to = 4, by = 0.05)
plot(x = y,
     y = lambda*exp(-y*lambda),
     ylab = paste0("f(y|lambda = ", lambda, ")"),
     xlab = "y",
     main = paste0("P(1.9<Y<2.1) = ", round(pexp(2.1, rate = lambda) - pexp(1.9, rate = lambda), 4)),
     type = "l",
     ylim = c(0,0.9),
     lwd = 2)
epsilon <- 0.1
y2 <- seq(from = 2-epsilon, to = 2+epsilon, length = 100)
polygon(x = c(y2, rev(y2)), y = c(lambda*exp(-y2*lambda), rep(0, length(y2))), col = "blue", lty = 0)

lambda <- 0.5
plot(x = y,
     y = lambda*exp(-y*lambda),
     ylab = paste0("f(y|lambda = ", lambda, ")"),
     xlab = "y",
     main = paste0("P(1.9<Y<2.1) = ", round(pexp(2.1, rate = lambda) - pexp(1.9, rate = lambda), 4)),
     type = "l",
     ylim = c(0,0.9),
     lwd = 2)
polygon(x = c(y2, rev(y2)), y = c(lambda*exp(-y2*lambda), rep(0, length(y2))), col = "blue", lty = 0)

lambda <- 1
plot(x = y,
     y = lambda*exp(-y*lambda),
     ylab = paste0("f(y|lambda = ", lambda, ")"),
     xlab = "y",
     main = paste0("P(1.9<Y<2.1) = ", round(pexp(2.1, rate = lambda) - pexp(1.9, rate = lambda), 4)),
     type = "l",
     ylim = c(0,0.9),
     lwd = 2)
polygon(x = c(y2, rev(y2)), y = c(lambda*exp(-y2*lambda), rep(0, length(y2))), col = "blue", lty = 0)
```

