Praktikum Komstat W11

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```
library(stats4)
library(MASS)
```

Binomial

```
set.seed(123)

xbinom <- rbinom(n = 300, size = 10, prob = 0.3)
n_binom <- 10

lbinom = function(p) {
  n = length(xbinom)
  x = xbinom
  llik = -sum(dbinom(x, size = n_binom, prob = p, log = TRUE))
  return(llik)
}

estbinom = mle(minuslogl = lbinom, start = list(p = 0.5), method = "L-BFGS-B",
               lower = 0.0001, upper = 0.9999)
summary(estbinom)
```

```
## Maximum likelihood estimation
##
## Call:
## mle(minuslogl = lbinom, start = list(p = 0.5), method = "L-BFGS-B",
##     lower = 1e-04, upper = 0.9999)
##
## Coefficients:
##    Estimate  Std. Error
## p 0.3030006 0.008390233
##
## -2 log L: 1043.97
```

Nilai estimasi p sangat dekat dengan parameter prob = 0.3 -> proses estimasi berjalan dengan baik.

Gamma

```r
set.seed(123)

xgamma <- rgamma(n = 300, shape = 2, rate = 1.5)

lgamma = function(alpha, lambda) {
  x = xgamma
  n = length(x)
  llik = -sum(dgamma(x, shape = alpha, rate = lambda, log = TRUE))
  return(llik)
}

estgamma = mle(minuslogl = lgamma, start = list(alpha = 1, lambda = 1),
               method = "L-BFGS-B", lower = c(0.0001, 0.0001))
summary(estgamma)
```

```
## Maximum likelihood estimation
##
## Call:
## mle(minuslogl = lgamma, start = list(alpha = 1, lambda = 1),
##     method = "L-BFGS-B", lower = c(1e-04, 1e-04))
##
## Coefficients:
##        Estimate Std. Error
## alpha  2.053352  0.1559570
## lambda 1.637339  0.1407742
##
## -2 log L: 661.6513
```

Nilai estimasi sangat dekat dengan parameter yang digunakan (shape = 2, rate = 1.5) -> proses estimasi berjalan dengan baik.

Pareto

```r
set.seed(123)

alpha_asli <- 2
xm <- 1
xpareto <- (runif(300) ^ (-1/alpha_asli)) * xm

lpareto = function(alpha) {
  x = xpareto
  xm = min(x)
  n = length(x)
  llik = -sum(log(alpha * xm^alpha / x^(alpha + 1)))
  return(llik)
}

estpareto = mle(minuslogl = lpareto, start = list(alpha = 1), method = "L-BFGS-B", lower = 0.0001)
summary(estpareto)
```

```
## Maximum likelihood estimation
##
## Call:
## mle(minuslogl = lpareto, start = list(alpha = 1), method = "L-BFGS-B",
##     lower = 1e-04)
##
## Coefficients:
##       Estimate Std. Error
## alpha 2.098374  0.1211496
##
## -2 log L: 442.9622
```

Nilai estimasi alpha sangat dekat dengan parameter alpha = 2 -> proses estimasi berjalan dengan baik.