Normalp

Prof. Massimiliano Giacalone

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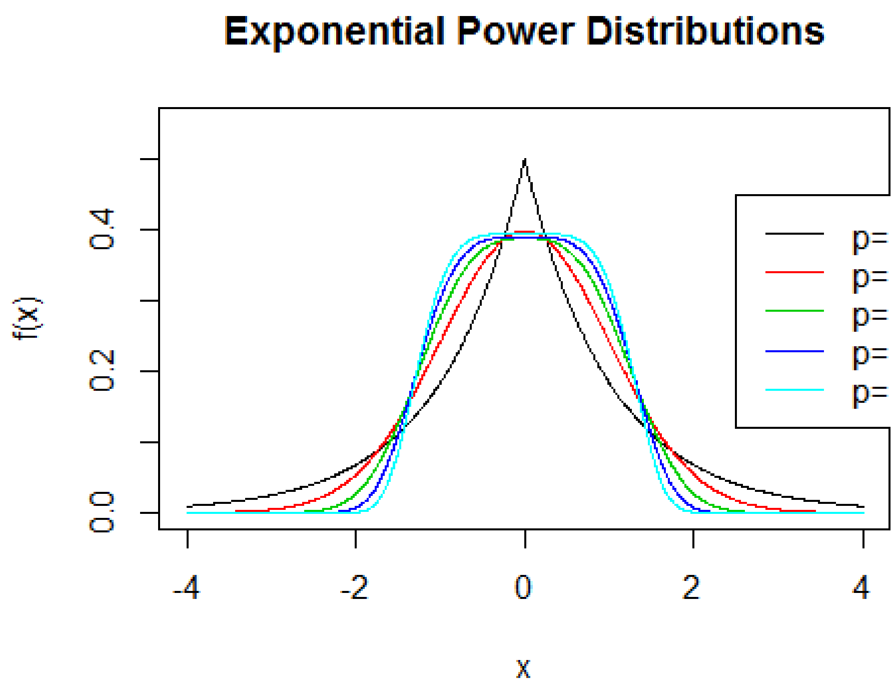
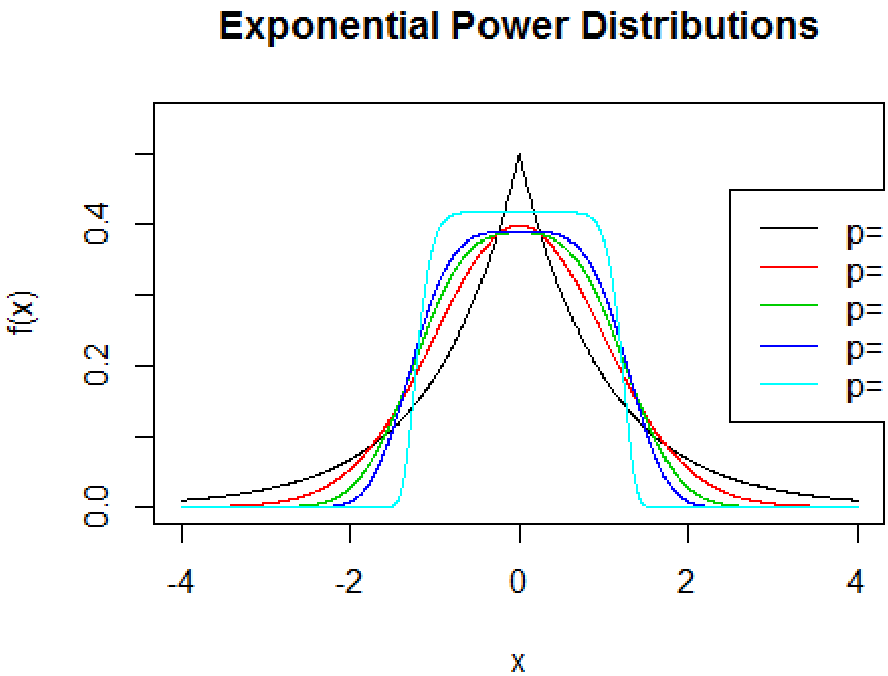
```
library('normalp')

#Let's compute the density for a x value with mu=0, sigmap=2 and p=2
dnormp(2, p=2)

## [1] 0.05399097

#Let's compute the distribution for a q value with mu=1, sigmap=2 and p=2
pnormp(0.7, mu=1, sigmap=2, p=2)

## [1] 0.4403823

#Let's compute the quantile for a probability value pr=0.4 with mu=3, sigmap=2 and
p=2
qnormp(0.4, mu=3, sigmap=2, p=1.5)

## [1] 2.51149

#In the following example, we generate a random sample of size n=30 from an
exponential power distribution
#with mu=2, sigmap=3 and p=1.5
rnormp(30,2,3,1.5)

##  [1]  8.0053821  8.1042743 -2.3606352  5.2568087  1.9550047  2.8596691
##  [7]  1.7795360  3.6183377  1.1902721  6.9011483  4.8606972  3.5129063
## [13]  3.3935536  1.4716770  6.4289855  1.1359680 -4.6231760  2.3544251
## [19] -2.8170461  3.9082953  3.3320523 -1.3695038 -2.3745950  8.2578143
## [25]  6.7712646  2.6541339 -0.3799379 -1.1570932 -2.2119725 -2.2464491

#With the following command, we plot 5 different distributions with p=1, 2, 3, 4,
5, 10, 20, 30, 50 (the last one will be the
```

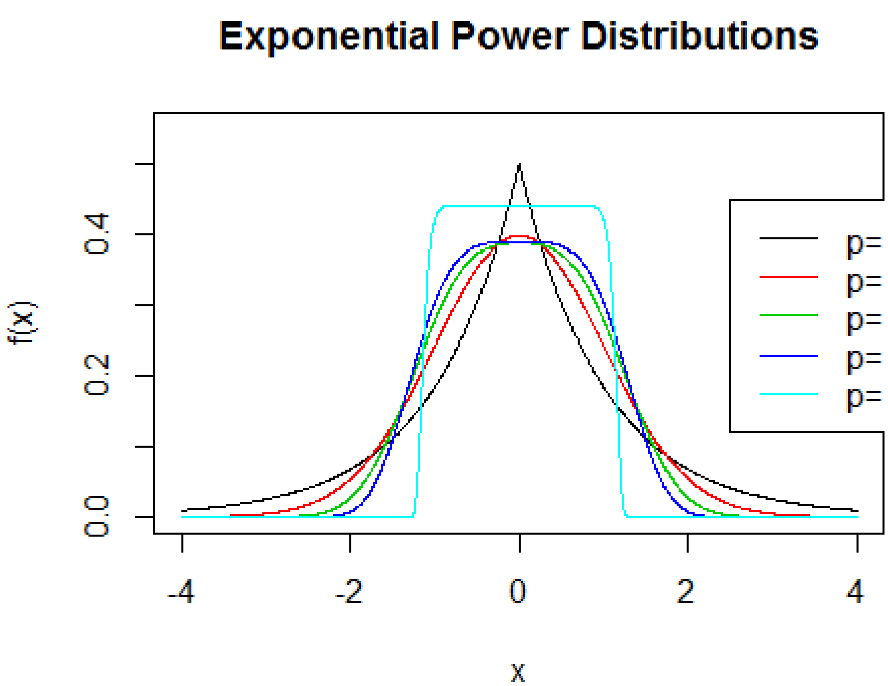
```
#uniform distribution)
graphnp(c(1:4,5))
```



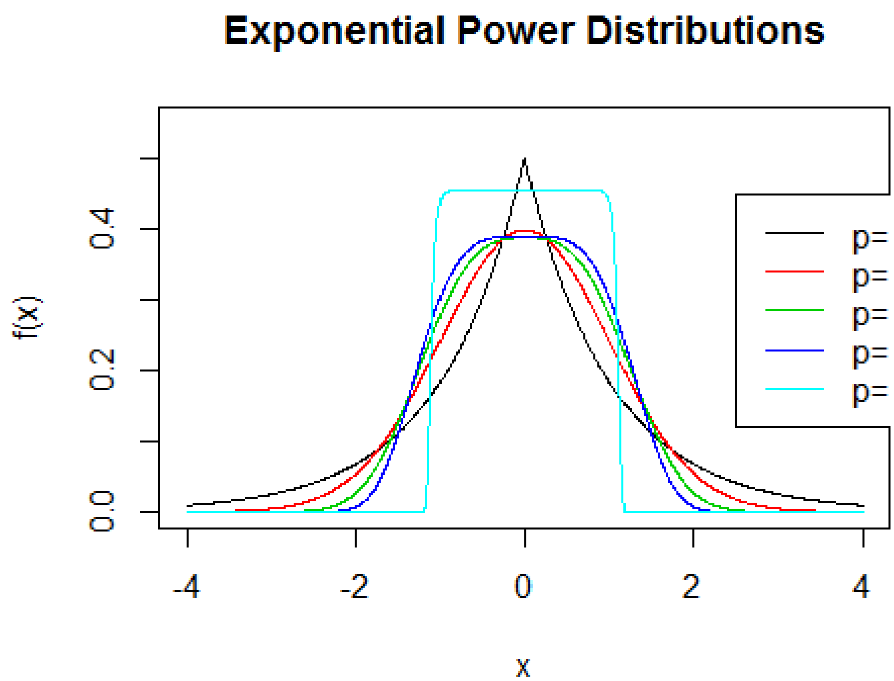

```
graphnp(c(1:4,10))
```



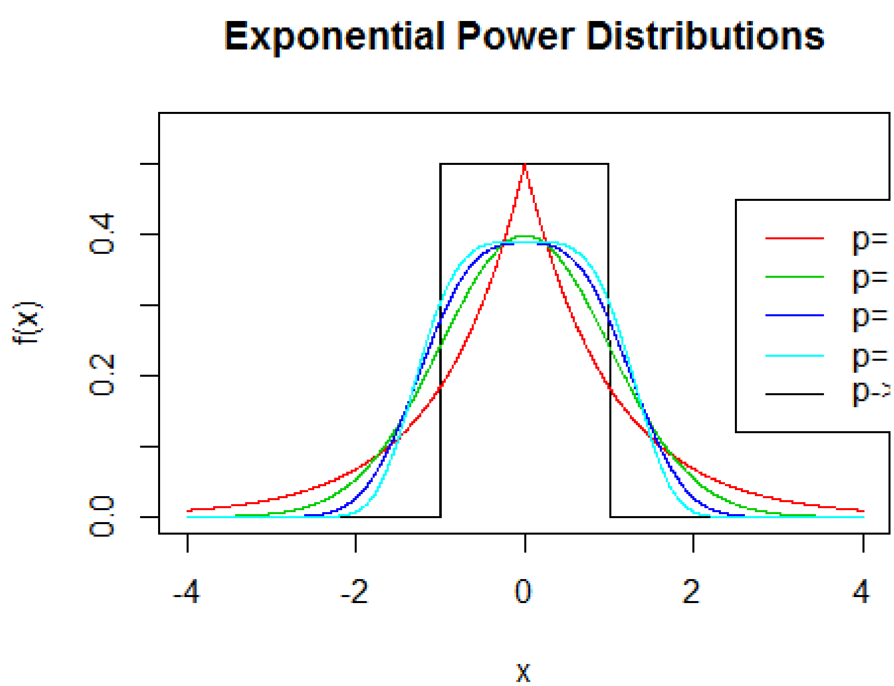

```
graphnp(c(1:4,20))
```



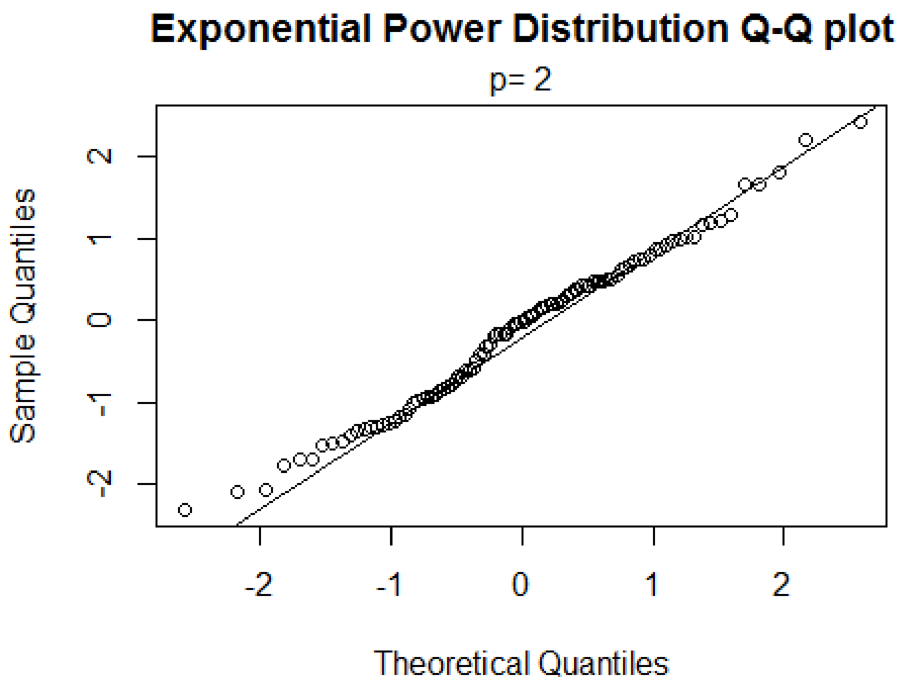

```
graphnp(c(1:4,30))
```




```
graphnp(c(1:4,50))
```



```r
#and an exponential power distribution Q-Q plot for a sample of size n=100:
x=rnormp(100, p=2)
qqnormp(x, p=2)
qqlinep(x, p=2)
```




```r
###Estimating the exponential power distribution parameters###

#Let's estimate the shape parameter p from a vector of observations:
x=rnormp(200,1,2,4)
p=estimatep(x, 1, 2)
p

## [1] 3.127864

#Let's estimate {inserire mu, sigmap } and p from a vector of observations:
x=rnormp(200,1,2,3)
parameters=paramp(x)
parameters
```

```
##     Mean       Mp       Sd       Sp        p
## 1.004110 1.030457 1.794412 2.004770 2.855000
##
## no.conv = FALSE
```

```
#Let's compute the values of theoretical and empirical indices of kurtosis, with p
known or estimated
kurtosis(p=1.5)
```

```
##       VI       B2       Bp
## 1.303127 3.761954 2.500000
```

```
kurtosis(x, p=1.5, value='parameter')
```

```
##       VI       B2       Bp
## 1.208993 2.355632 1.852478
```

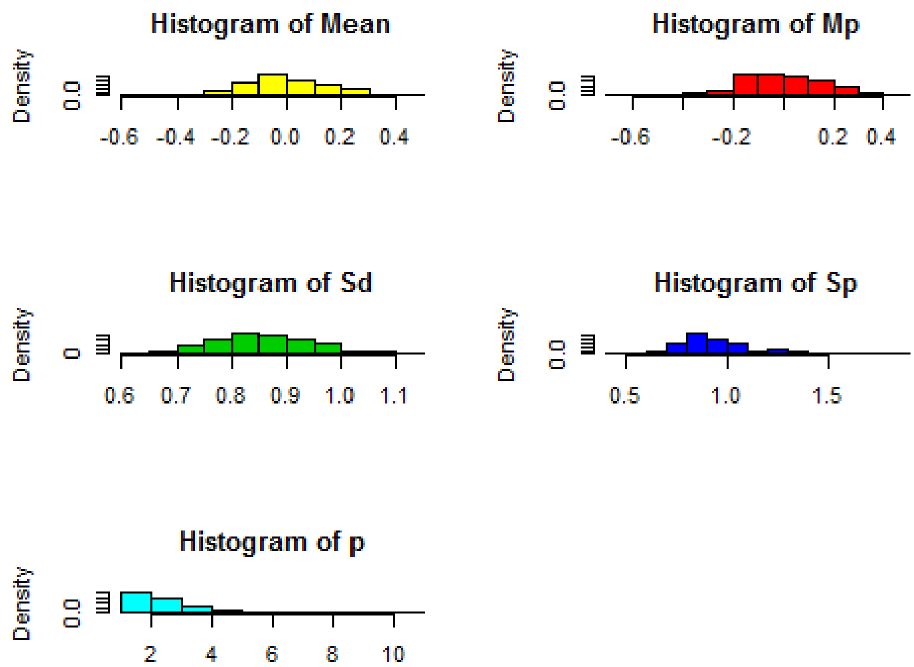
```
kurtosis(x)
```

```
##       VI       B2       Bp
## 1.207764 2.345899 3.503474
```

```
#Let's perform a simulation plan for m=200 samples of size n=30, with mu=0,
sigmap=1, p=3, by showing
#the histogram for each set of estimates
sim=simul.mp(30, 200, p=3)
sim
```

```
##                 Mean           Mp          Sd          Sp        p
## Mean     0.001880339 -0.007492459 0.85687655 0.95915706 3.374070
## Variance 0.024985574  0.027781130 0.00868146 0.04562682 7.531195
##
## Number of samples with a difficult convergence: 10
```

```
par(mfrow=c(3,2))
plot(sim)
par(mfrow=c(1,1))
```



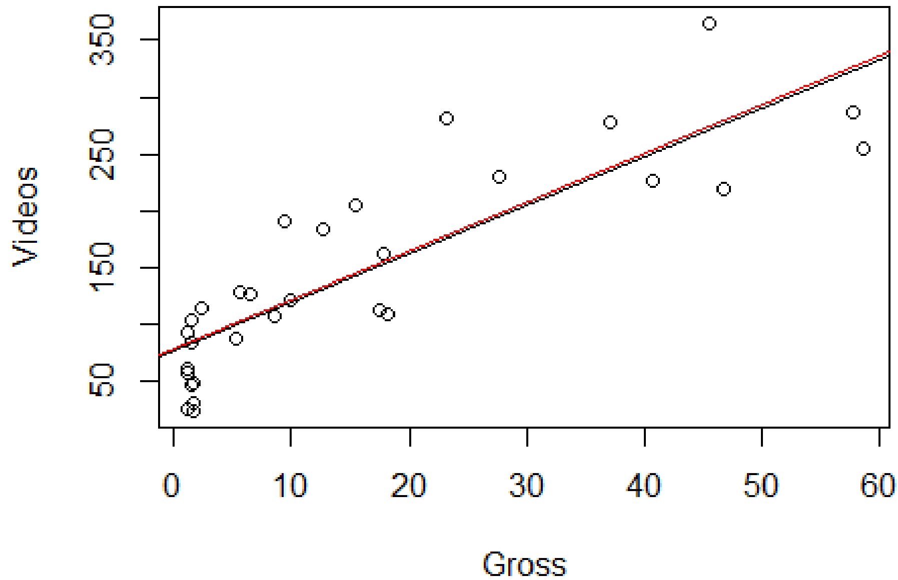

```
###Fitting a linear regression model with random errors distributed according to
an exponential power distribution###

#We consider an example that has the only purpose to show the use of the
implemented functions to fit a
#linear regression model when we have to assume that the random errors are
distributed according to an exponential
#power distribution

dataset

##    Gross Videos
## 1   1.10  57.18
## 2   1.13  26.17
## 3   1.18  92.79
## 4   1.25  61.60
## 5   1.44  46.50
## 6   1.53  85.06
## 7   1.53 103.52
```

```
## 8   1.69  30.88
## 9   1.74  49.29
## 10  1.77  24.14
## 11  2.42 115.31
## 12  5.34  87.04
## 13  5.70 128.45
## 14  6.43 126.64
## 15  8.59 107.28
## 16  9.36 190.80
## 17  9.89 121.57
## 18 12.66 183.30
## 19 15.35 204.72
## 20 17.55 112.47
## 21 17.91 162.95
## 22 18.25 109.20
## 23 23.13 280.79
## 24 27.62 229.51
## 25 37.09 277.68
## 26 40.73 226.73
## 27 45.55 365.14
## 28 46.62 218.64
## 29 57.70 286.31
## 30 58.51 254.58
```

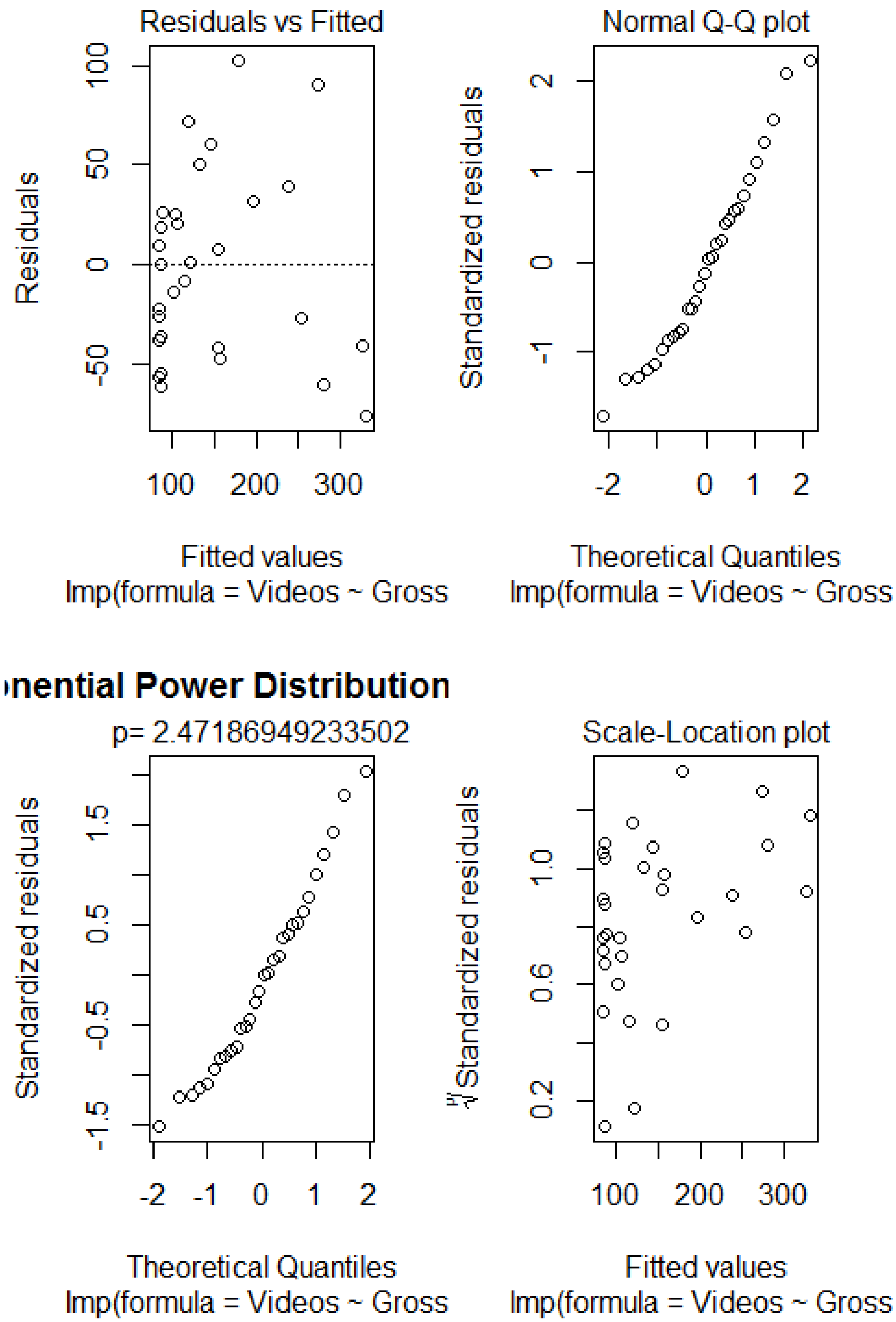
```
attach(dataset)
res.lmp=lmp(Videos~Gross)
res.lmp
```

```
##
## Call:
## lmp(formula = Videos ~ Gross)
##
## Coefficients:
## (Intercept)        Gross
##      78.235        4.317
```

```r
#Let's report a summary of the mian results with a plot showing the 2 straight
lines derived by using the
#OLS methods and the lmp() method:

summary(res.lmp)

##
## Call:
## lmp(formula = Videos ~ Gross)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -76.224 -40.236  -3.907  26.374 102.710
##
## Coefficients:
## (Intercept)       Gross
##      78.235       4.317
##
## Estimate of p
## `2.471869`
##
## Power deviation of order p: 51.69

plot(Videos~Gross)
abline(lm(Videos~Gross))
abline(res.lmp, col='red')
```




```
#Let's perform an analysis of residuals:
par(mfrow=c(1.5,2))
plot(res.lmp)
```




```
#Let's perform a simulation plan for m=200 samples of size n=30 for a linear
regression model with only one
#regressor, by showing the histogram for each set of estimates
```

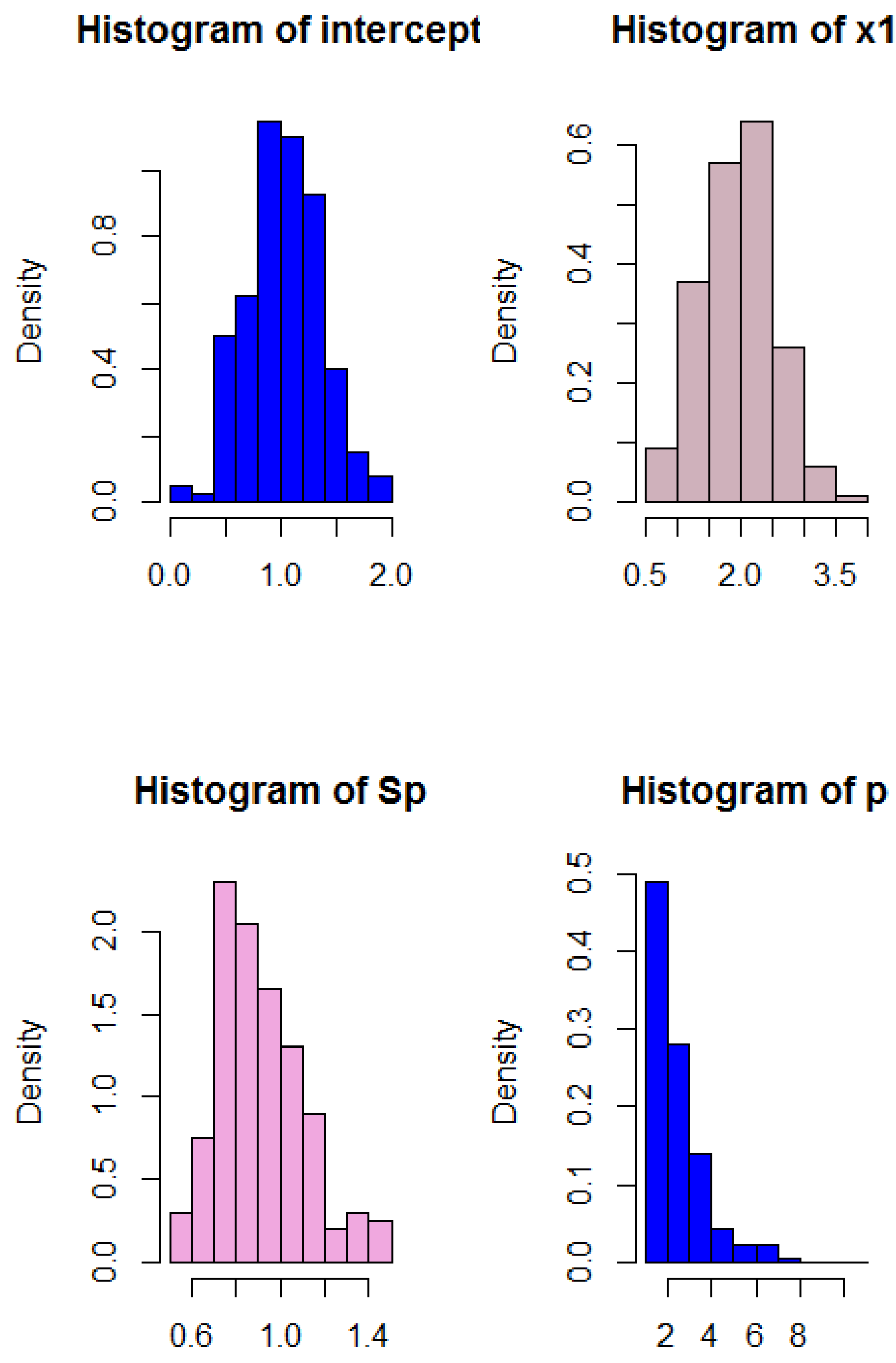
```r
sim=simul.lmp(30,200,1,2,1,1,3)
sim
```

```
##           (intercept)        x1          Sp        p
## Mean        1.0264802 1.9712919 0.91180743 3.012432
## Variance    0.1151872 0.3411297 0.03726107 6.326452
##
## Number of samples with a difficult convergence: 1
```

```r
summary(sim)
```

```
## Results:
##           (intercept)        x1          Sp        p
## Mean        1.0264802 1.9712919 0.91180743 3.012432
## Variance    0.1151872 0.3411297 0.03726107 6.326452
##
## Coefficients:
## (intercept)          x1
##           1           2
##
## Formula:
## y ~ +x1
## <environment: 0x00000000073de4b0>
##
## Number of samples:
## `200`
##
## Value of p:
## `3`
##
## Number of samples with problems on convergence
## `1`
```

```r
par(mfrow=c(1.5,2))
plot(sim)
```


Histogram of intercept
Histogram of x1
Histogram of Sp
Histogram of p
Density
0.0
0.4
0.8
1.0
2.0
0.2
0.6
0.5
2.0
3.5
1.5
0.6
1.4
0.1
0.3
0.5
2
4
6
8