

# Análisis y Tratamiento de Datos con R: Departamento de Matemática

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## Bootstrap

```
x = c(30,37,36,43,42,43,43,46,41,42)
n = length(x)
set.seed(1)
# sample mean
xbar = mean(x)

nboot = 20
# Generate 20 bootstrap samples, i.e. an n x 20 array of
# random resamples from x.
tmpdata = sample(x,n*nboot, replace=TRUE)
bootstrapsample = matrix(tmpdata, nrow=n, ncol=nboot)

# Compute the means xbar*
xbarstar = colMeans(bootstrapsample)

# Compute delta* for each bootstrap sample
deltastar = xbarstar - xbar

# Find the 0.1 and 0.9 quantile for deltastar
d = quantile(deltastar, c(0.1, 0.9))

# Calculate the 80\% confidence interval for the mean.
ci = xbar - c(d[2], d[1])
cat('Confidence interval: ',ci,'\n')
```

## Confidence interval: 38.19 41.02

Old Faithful: confidence intervals for the median:

Bootstrap 95 % CI for R-Squared

```
library(boot)
# function to obtain R-Squared from the data
rsq <- function(formula, data, indices) {
```

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\*,

```

d <- data[indices,] # allows boot to select sample
fit <- lm(formula, data=d)
return(summary(fit)$r.square)
}
# bootstrapping with 1000 replications
results <- boot(data=mtcars, statistic=rsq,
  R=1000, formula=mpg~wt+disp)

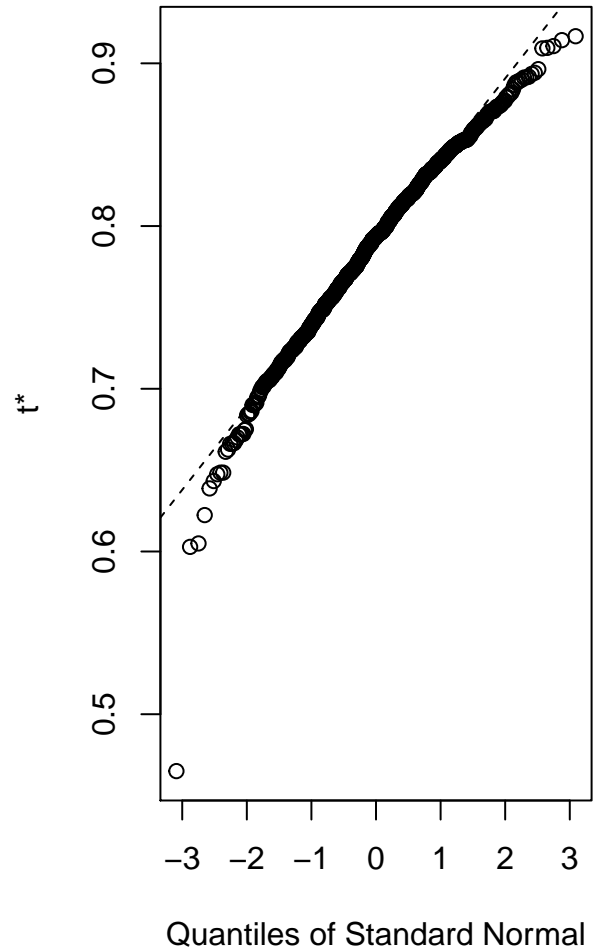
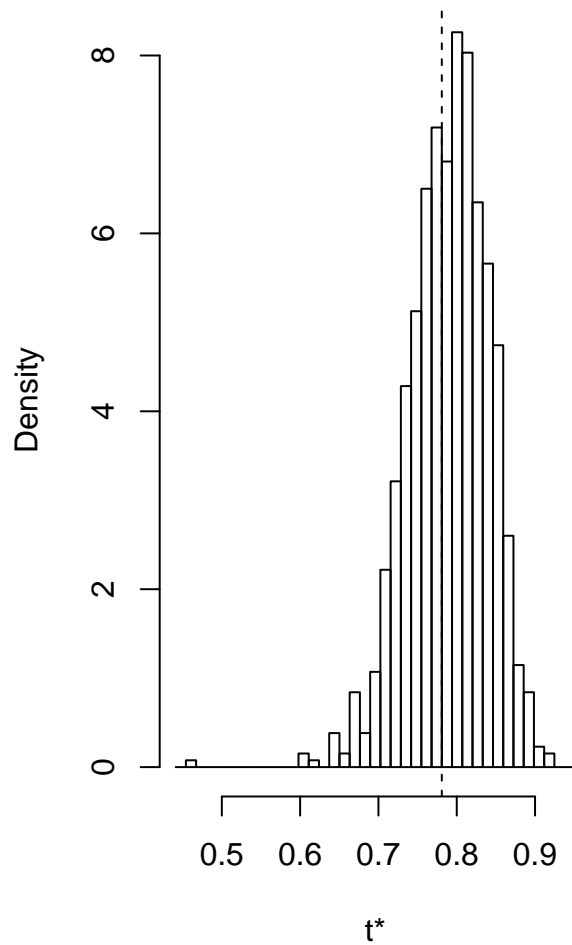
# view results
results

##
## ORDINARY NONPARAMETRIC BOOTSTRAP
##
##
## Call:
## boot(data = mtcars, statistic = rsq, R = 1000, formula = mpg ~
##      wt + disp)
##
##
## Bootstrap Statistics :
##      original      bias    std. error
## t1* 0.7809306 0.008663872 0.05056547

plot(results)

```

## Histogram of t



```
# get 95% confidence interval
boot.ci(results, type="bca")
```

```
## BOOTSTRAP CONFIDENCE INTERVAL CALCULATIONS
## Based on 1000 bootstrap replicates
##
## CALL :
## boot.ci(boot.out = results, type = "bca")
##
## Intervals :
## Level      BCa
## 95%      ( 0.6499,  0.8603 )
## Calculations and Intervals on Original Scale
## Some BCa intervals may be unstable
```