```r
#GUIA 8

Notas<-c(4.47,4.47,3.48,5.0,3.42,3.78,3.1,3.57,4.2,4.5,3.6,3.75,4.5,2.85,3.7,4.2,3.2,4.05,4.
```

```
##  [1] 4.47 4.47 3.48 5.00 3.42 3.78 3.10 3.57 4.20 4.50 3.60 3.75 4.50 2.85
## [15] 3.70 4.20 3.20 4.05 4.90 5.10 5.30 4.16 4.56 3.54 3.50 5.20 4.71 3.70
## [29] 4.78 4.14 4.14 4.80 4.10 3.83 3.60 2.98 4.32 5.10 4.30 3.90 3.96 3.54
## [43] 4.80 4.30 3.39 4.47 3.19 3.75 3.10 4.70 3.69 3.30 2.85 5.25 4.68 4.04
## [57] 4.44 5.43 3.04 2.95
```

```r
data.entry(Notas)
Notas
```

```
##  [1] 4.47 4.47 3.48 5.00 3.42 3.78 3.10 3.57 4.20 4.50 3.60 3.75 4.50 2.85
## [15] 3.70 4.20 3.20 4.05 4.90 5.10 5.30 4.16 4.56 3.54 3.50 5.20 4.71 3.70
## [29] 4.78 4.14 4.14 4.80 4.10 3.83 3.60 2.98 4.32 5.10 4.30 3.90 3.96 3.54
## [43] 4.80 4.30 3.39 4.47 3.19 3.75 3.10 4.70 3.69 3.30 2.85 5.25 4.68 4.04
## [57] 4.44 5.43 3.04 2.95
```

```r
length(Notas)
```

```
## [1] 60
```

```r
write(Notas, "Notas.txt")
ls()
```

```
## [1] "Notas"
```

```r
rm(list=ls(all=TRUE))
ls()
```

```
## character(0)
```

```r
X <- scan("Notas.txt", what = double(0), na.strings = "NA", flush=FALSE)
ls()
```

```
## [1] "X"
```

```r
n <- length(X); n
```

```
## [1] 60
```

```r
k <- 1+3.322*logb(60, 10); k
```

```
## [1] 6.907018
```

```r
k <- round(k); k
```

```
## [1] 7
```

```r
rango <- max(X)-min(X); rango
```

```
## [1] 2.58
```

```r
a=rango/k; a
```

```
## [1] 0.3685714
```

```r
a <- round(a, 3); a
```

```
## [1] 0.369
```

```r
rango <- max(X)-min(X); rango
```

```
## [1] 2.58
```

```r
a=rango/k; a
```

```
## [1] 0.3685714
```

```r
a <- round(a, 3); a
```

```
## [1] 0.369
```

```r
limites <- seq(from=min(X)-0.01/2, to=max(X)+0.01/2, by=a); limites
```

```
## [1] 2.845 3.214 3.583 3.952 4.321 4.690 5.059 5.428
```

```r
options(digits=4)
ci <- cbind(1:k); ci
```

```
##      [,1]
## [1,]    1
## [2,]    2
## [3,]    3
## [4,]    4
## [5,]    5
## [6,]    6
## [7,]    7
```

```r
for(i in 2:length(limites)) ci[i-1, 1] <- (limites[i] + limites[i-1])/2
ci
```

```
##       [,1]
## [1,] 3.030
## [2,] 3.399
## [3,] 3.768
## [4,] 4.136
## [5,] 4.505
## [6,] 4.875
## [7,] 5.244
```

```r
options(digits=2)
fi <- cbind(table(cut(X, breaks = limites, labels=NULL, include.lowest=FALSE,
right=FALSE, dig.lab=4))); fi
```

```
##               [,1]
## [2.845,3.214)    9
## [3.214,3.583)    8
## [3.583,3.952)   10
## [3.952,4.321)   12
## [4.321,4.69)     8
## [4.69,5.059)     7
## [5.059,5.428)    5
```

```r
options(digits=4)
fri <- fi/n; fri
```

```
##                   [,1]
## [2.845,3.214) 0.15000
## [3.214,3.583) 0.13333
## [3.583,3.952) 0.16667
## [3.952,4.321) 0.20000
## [4.321,4.69)  0.13333
## [4.69,5.059)  0.11667
## [5.059,5.428) 0.08333
```

```r
options(digits=2)
Fi <- cumsum(fi); Fi
```

```
## [1]  9 17 27 39 47 54 59
```

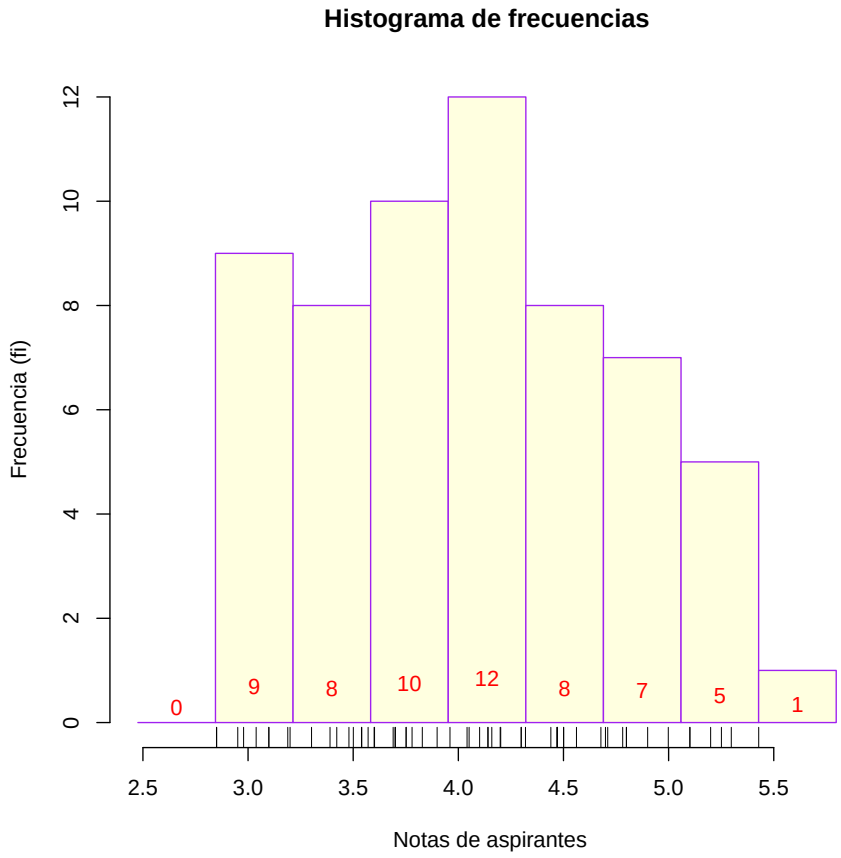
```r
options(digits=4)
Fri <- Fi/n; Fri
```

```
## [1] 0.1500 0.2833 0.4500 0.6500 0.7833 0.9000 0.9833
```

```r
tablaFrec <- data.frame(ci=ci, fi=fi, fri=fri, Fi=Fi, Fri=Fri); tablaFrec
```

```
##                   ci fi     fri Fi    Fri
## [2.845,3.214) 3.030  9 0.15000  9 0.1500
## [3.214,3.583) 3.399  8 0.13333 17 0.2833
## [3.583,3.952) 3.768 10 0.16667 27 0.4500
## [3.952,4.321) 4.136 12 0.20000 39 0.6500
## [4.321,4.69)  4.505  8 0.13333 47 0.7833
## [4.69,5.059)  4.875  7 0.11667 54 0.9000
## [5.059,5.428) 5.244  5 0.08333 59 0.9833
```

```r
h <- hist(X, breaks=c(limites[1]-a, limites, limites[k+1]+a), freq = TRUE, probability = FAI
include.lowest = FALSE,right = TRUE, main = "Histograma de frecuencias",
col="lightyellow", lty=1, border="purple", xlab=" Notas de aspirantes", ylab="Frecuencia (fi
axes=TRUE, labels=FALSE)
text(h$mids, h$density, h$counts, adj=c(0.5, -0.5), col="red")
rug(jitter(X)) # adiciona marcas de los datos
```

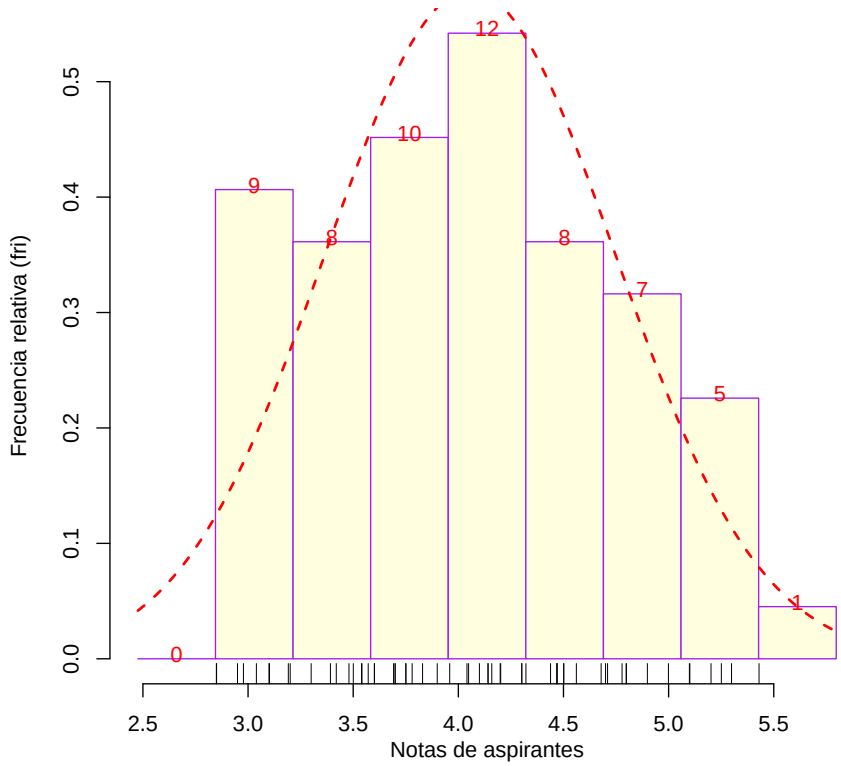



```r
is.list(h); h
```

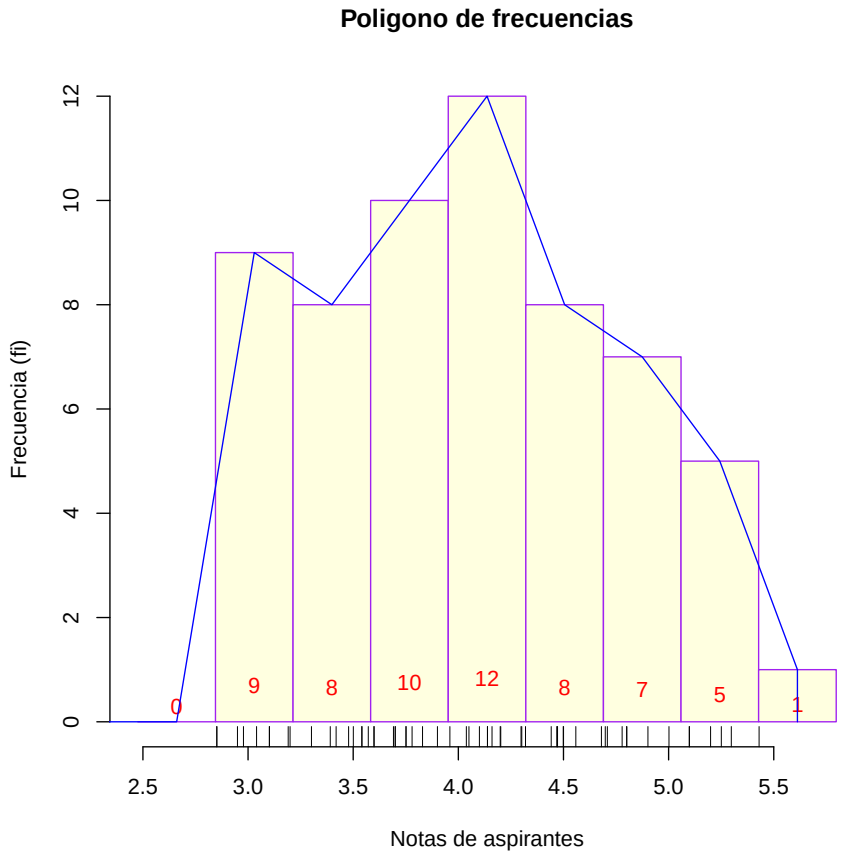
```
## [1] TRUE
## $breaks
##  [1] 2.476 2.845 3.214 3.583 3.952 4.321 4.690 5.059 5.428 5.797
##
## $counts
## [1]  0  9  8 10 12  8  7  5  1
##
```

```
## $density
## [1] 0.00000 0.40650 0.36134 0.45167 0.54201 0.36134 0.31617 0.22584 0.04517
##
## $mids
## [1] 2.660 3.030 3.399 3.768 4.136 4.505 4.875 5.244 5.613
##
## $xname
## [1] "X"
##
## $equidist
## [1] TRUE
##
## attr(,"class")
## [1] "histogram"
```

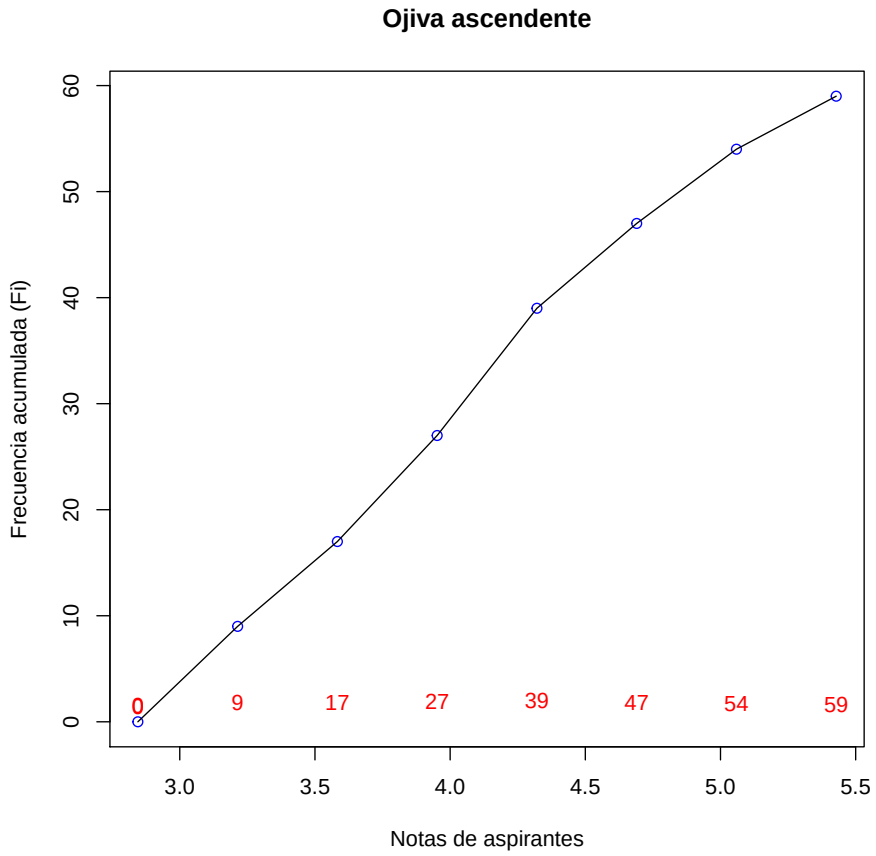
```
h <- hist(X, breaks=c(limites[1]-a, limites, limites[k+1]+a), freq = FALSE,
probability = TRUE, include.lowest = FALSE, right = TRUE,
main="Aproximacion a una Normal\n", col="lightyellow",lty=1,border="purple",
xlab="Notas de aspirantes\n", ylab="Frecuencia relativa (fri)",
axes=TRUE, labels=FALSE)
text(h$mids, h$density, h$counts, adj=c(0.5, 0.2), col="red")
rug(jitter(X)) # adiciona marcas de los datos
curve(dnorm(x, mean=mean(X), sd=sd(X)), col = 2, lty = 2,lwd = 2, add = TRUE)
```




```
h <- hist(X, breaks=c(limites[1]-a, limites, limites[k+1]+a), freq = TRUE,
probability=FALSE, include.lowest=FALSE,right=TRUE,
main = "Poligono de frecuencias",col="lightyellow", lty=1, border="purple", xlab="
Notas de aspirantes", ylab="Frecuencia (fi)", axes=TRUE, labels=FALSE)
text(h$mids, h$density, h$counts, adj=c(0.5, -0.5), col="red")
rug(jitter(X)) # adiciona marcas de los datos
vCi <- c(h$mids[1]-a, h$mids, h$mids[k+1]+a); vCi

##  [1] 2.292 2.660 3.030 3.399 3.768 4.136 4.505 4.875 5.244 5.613 5.613

vfi <- c(0, h$counts, 0); vfi

##  [1]  0  0  9  8 10 12  8  7  5  1  0

lines(vCi, vfi, col="blue", type="l")
```




```
Fia <- c(0, Fi); Fia

## [1]  0  9 17 27 39 47 54 59

plot(limites, Fia, type = "p", pch=1, col = "blue", main="Ojiva ascendente",
xlab="Notas de aspirantes", ylab="Frecuencia acumulada (Fi)")
text(limites, h$density, Fia, adj=c(0.5, -0.5), col="red")
lines(limites, Fia, col="black", type="l")
```

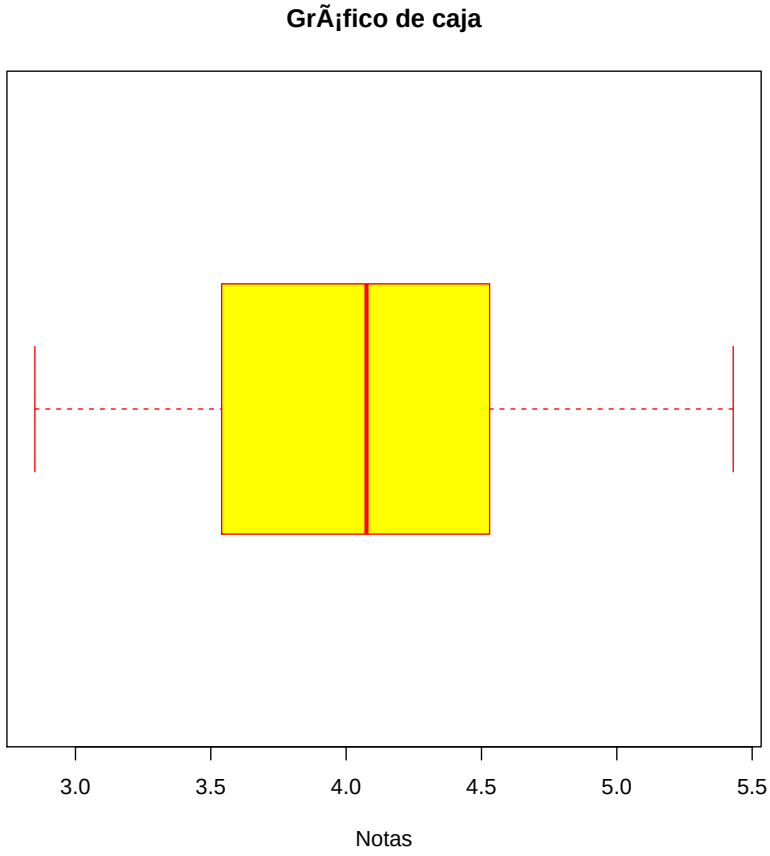



```
#Calcula los principales estadadisticos descriptivos de la variable
# Calcula la moda, ya que el R no proporciona una funcin para eso.
options(digits=4)
for(i in 1:k) if (fi[i] == max(fi)) break()
if(i > 1) moda <- limites[i]+((fi[i]-fi[i-1])/((fi[i]-fi[i-1])+(fi[i]-fi[i+1]) ))*a else  mo
moda
```

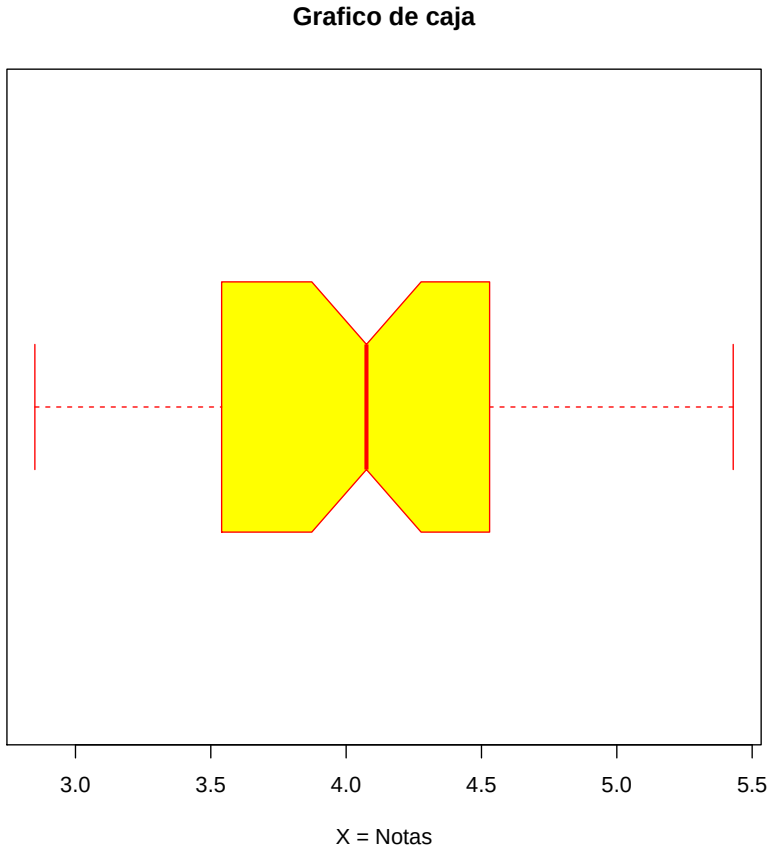
```
## [1] 4.075
```

```
# Calcula los cuartiles: Q1, Q2, Q3
Q <- 1:3
for(v in 1:3) for(i in 1:k) if (Fi[i] > (v*25*n)/100)
{
Q[v] <- limites[i]+(((25*v*n/100)-Fi[i-1])/fi[i])*a
break
}
Q
```

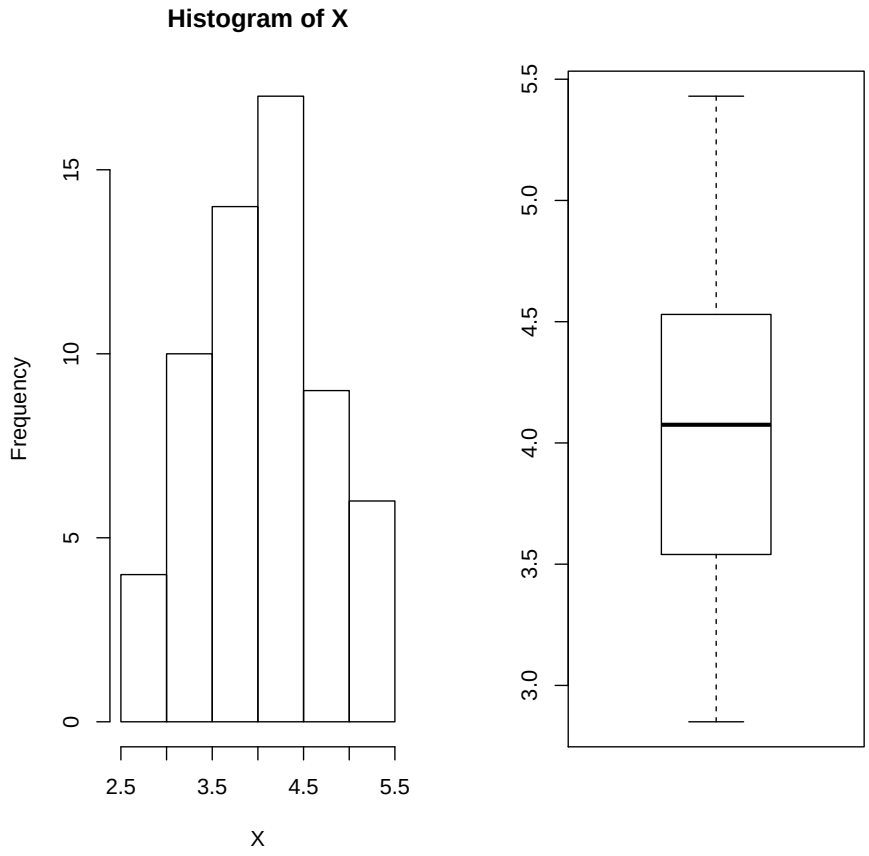
```
## [1] 3.491 4.044 4.598

#Calcula los principales estadisticos.
estadisticos <- rbind(media=sum(tabEstad$cifi)/n, moda=moda, Q1=Q[1], Q2=Q[2], Q3=Q[3],
rango=max(X)-min(X), varianza=sum(tabEstad$ciMedia2fi)/n,
Desviacion=sqrt(sum(tabEstad$ciMedia2fi)/n),
CoeficienteVariacion=sqrt(sum(tabEstad$ciMedia2fi)/n)/(sum(tabEstad$cifi)/n),
CAfisher=(sum(tabEstad$ciMedia3fi)/n)/sqrt(sum(tabEstad$ciMedia2fi)/n)^3,
CoeficienteCurtosis=((sum(tabEstad$ciMedia4fi)/n)/sqrt(sum(tabEstad$ciMedia2fi)/n)^4)-3)

## Error in rbind(media = sum(tabEstad$cifi)/n, moda = moda, Q1 = Q[1],
Q2 = Q[2], :  objeto 'tabEstad' no encontrado

estadisticos

## Error in eval(expr, envir, enclos):  objeto 'estadisticos' no encontrado

# Grafico de cajas
boxplot(X, main="Grfico de caja", xlab="Notas", notch=FALSE,
data=parent.frame(), plot=TRUE, border="red", col="yellow",horizontal=TRUE)
```



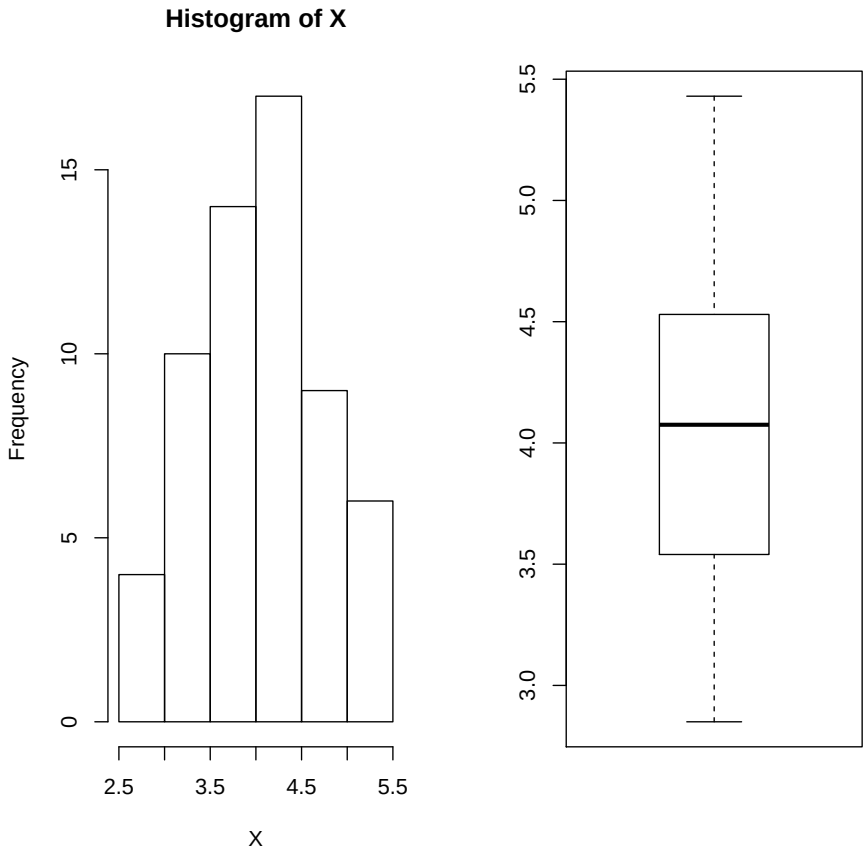

```
#Observacion: en la funcin boxplot(), s? plot es FALSE se produce un resumen de los valores


windows()
boxplot(X, main="Grafico de caja", xlab="X = Notas", notch=TRUE,
data=parent.frame(), plot=TRUE, border="red", col="yellow",horizontal=TRUE)

par(mfrow=c(1,2)) # Divide la ventana grafica en dos partes (1 fila, 2 columnas)
mtext(side=3, line=0, cex=2, outer=T, "Titulo para Toda la Pagina")
```




```
hist(X); boxplot(X)

#Calcula los principales estadsticos descriptivos de la variable
# Calcula la moda, ya que el R no proporciona una funcin para eso.
options(digits=4)
for(i in 1:k) if (fi[i] == max(fi)) break()
if(i > 1) moda <- limites[i]+((fi[i]-fi[i-1])/((fi[i]-fi[i-1])+(fi[i]-fi[i+1]) ))*a
moda <- limites[i]+(fi[i]/(fi[i]+(fi[i]-fi[i+1])))*a
moda

## [1] 4.229

#Varios grficos en una misma ventana
par(mfrow=c(1,2)) # Divide la ventana grfica en dos partes (1 fila, 2 columnas)
mtext(side=3, line=0, cex=2, outer=T, "Titulo para Toda la Pgina")
```




```
hist(X); boxplot(X)
```


Histogram of X
Frequency
0
5
10
15
2.5
3.5
4.5
5.5
X
3.0
3.5
4.0
4.5
5.0
5.5