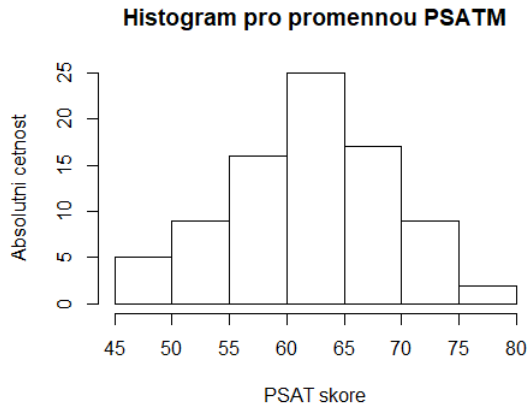
Popisne_math.R

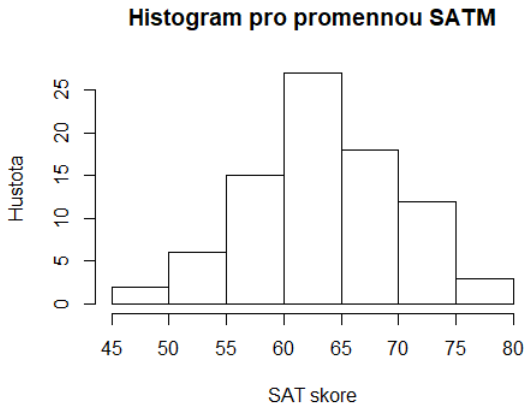
```
## Databaze obsahuje informace o pripravnych kurzech z matematiky
# pro studenty strednich skol v USA

## promenne:
# Student: ID studenta
# Gender: pohlavi studenta: m - muz, z - zena
# PSATM: PSAT skore matematickeho testu
# SATM: SAT skore matematickeho testu
# ACTM: ACT skore matematickeho testu
# Rank: poradi v ramci tridy, kde student test psal
# Size: pocet studentu ve tride, kde student test psal
# GPAadj: prumerne skore z matematickych testu
# PlcmtScore: body v rozrazovacim testu
# Recommends: doporucena uroven kurzu, ktery by student mel navstevovat
# Course: skutecny kurz, ktery si student vybral
# Grade: vysledek vystupniho testu z kurzu
# RecTaken: zvolil si student doporucenou uroven: 1 - Ano, 0 - Ne
# TooHigh: zvolil si student tezsi kurz nez doporuceny: 1 - Ano, 0 - Ne
# TooLow: zvolil si student lehci kurz nez doporuceny: 1 - Ano, 0 - Ne
# CourseSuccess: uspesne absolvovani kurzu: 1 - Ano (vysledek B nebo lepsi),
#                                           0 - Ne (vysledek horsi nez B)

##############################################
# Popisne statistiky ciselnych promennych
ind.num<-c(3,4,5,6,7,8,9)
ciselne<-Math[,ind.num]
vystup.num<-matrix(NA,length(ind.num),12)
for(i in 1:length(ind.num)){
  vystup.num[i,1]<-mean(ciselne[,i])
  vystup.num[i,2:6]<-fivenum(ciselne[,i])
  vystup.num[i,7]<-sd(ciselne[,i])
  vystup.num[i,8]<-IQR(ciselne[,i])
  vystup.num[i,9]<-MAD(ciselne[,i])
  vystup.num[i,10]<-CoefVar(ciselne[,i])
  vystup.num[i,11]<-Skew(ciselne[,i])
  vystup.num[i,12]<-Kurt(ciselne[,i])
}
rownames(vystup.num)<-names(Math)[ind.num]
colnames(vystup.num)<-c("Mean","Min","1st Qu","Median","3rd
Qu","Max","SD","IQR","MAD","CoefVar","Skew","Kurt")
vystup.num
```

```
##                 Mean Min 1st Qu Median 3rd Qu Max         SD   IQR      MAD
## PSATM       62.60241  47   58.5     64   66.5  80   6.878634   8.0   5.9304
## SATM        64.09639  46   59.0     65   68.0  79   6.647234   9.0   5.9304
## ACTM        28.34940  17   27.0     29   31.0  36   3.430259   4.0   2.9652
## Rank        37.24096   1    3.0     14   47.0 236  51.465733  44.0  19.2738
## Size       341.66265  42  219.5    350  471.0 634 154.219615 251.5 180.8772
## GPAadj      37.63855  29   36.5     39   40.0  40   2.761134   3.5   1.4826
## PlcmtScore  38.85542  19   33.0     39   44.5  55   8.618093  11.5   8.8956
```

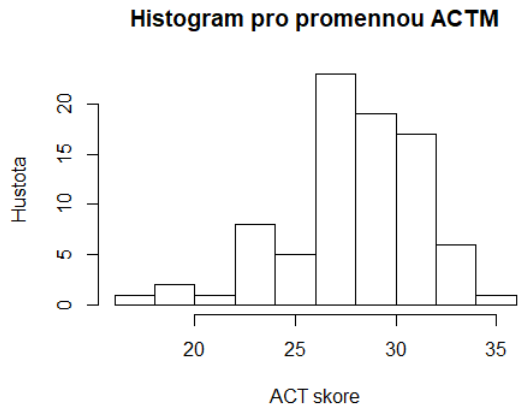
```
##              CoefVar       Skew        Kurt
## PSATM      0.1098781 -0.1870891 -0.32261470
## SATM       0.1037068 -0.2132136 -0.09957625
## ACTM       0.1209994 -0.7420380  0.85505697
## Rank       1.3819657  1.9078128  3.36332229
## Size       0.4513798 -0.2853588 -1.05393805
## GPAadj     0.0733592 -1.2512651  0.80988789
## PlcmtScore 0.2217990 -0.1660975 -0.68141078
```

```r
# Histogramy
hist(PSATM,col="white",xlab="PSAT skore",ylab="Absolutni cetnost",main="Histogram pro promennou PSATM")

hist(SATM,col="white",xlab="SAT skore",ylab="Hustota",main="Histogram pro promennou SATM")
```

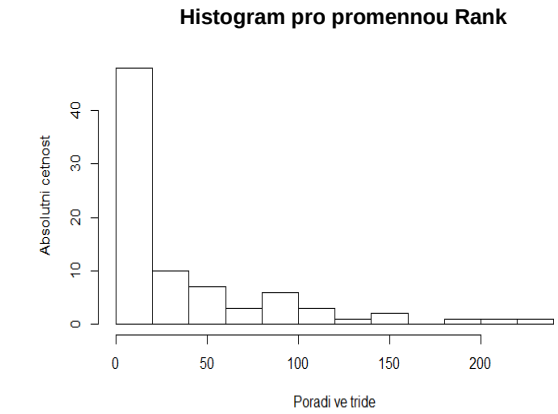


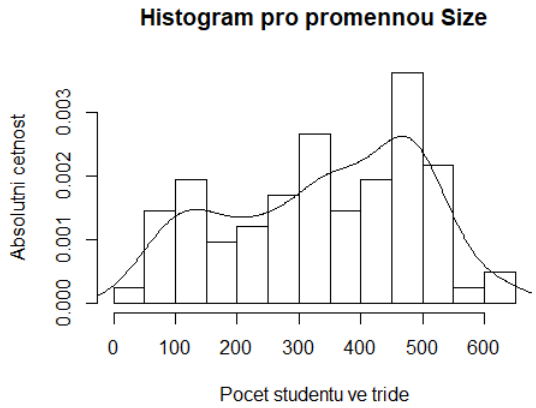



```r
hist(ACTM,col="white",xlab="ACT skore",ylab="Hustota",main="Histogram pro promennou ACTM")
```

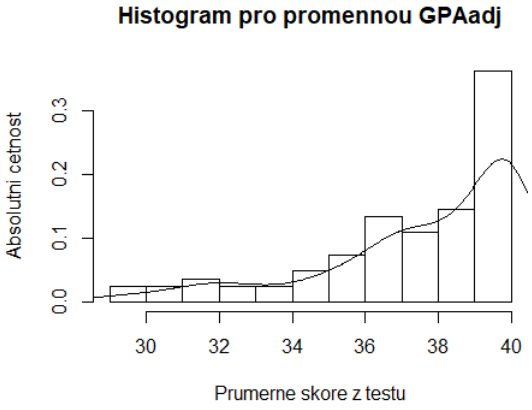


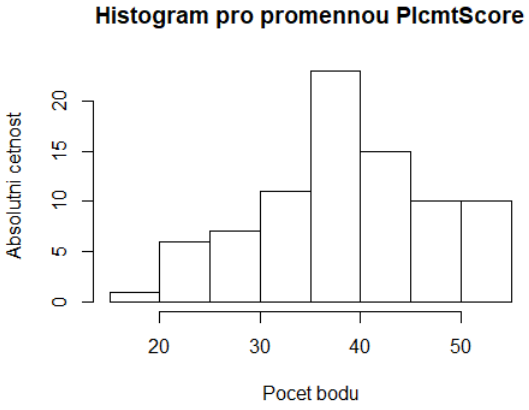
```r
hist(Rank,breaks=10,col="white",xlab="Poradi ve tride",ylab="Absolutni
cetnost",main="Histogram pro promennou Rank")

hist(Size,freq=F,breaks=10,col="white",xlab="Pocet studentu ve tride",ylab="Absolutni
cetnost",main="Histogram pro promennou Size")
lines(density(Size,bw=50))
```



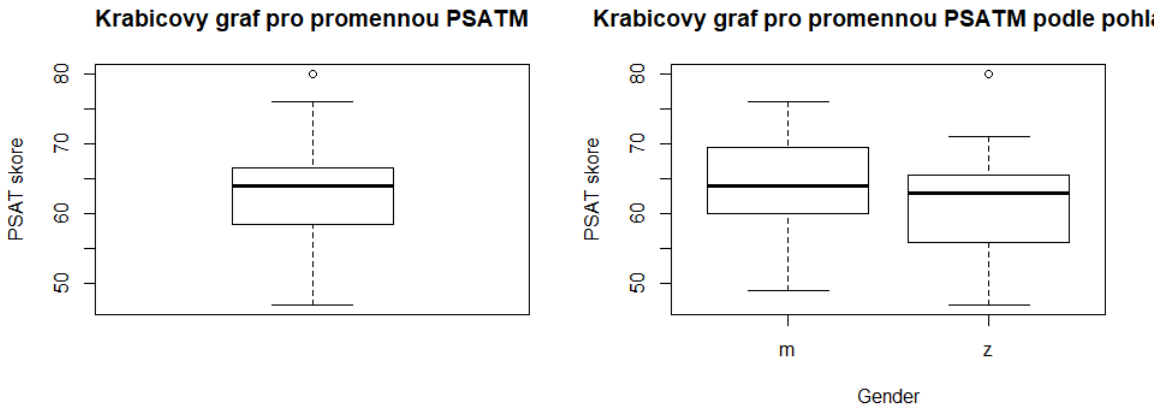



```r
hist(GPAadj,freq=F,breaks=10,col="white",xlab="Prumerne skore z
testu",ylab="Absolutni cetnost",main="Histogram pro promennou GPAadj")
lines(density(GPAadj,bw=0.8))

hist(PlcmtScore,breaks=10,col="white",xlab="Pocet bodu",ylab="Absolutni
cetnost",main="Histogram pro promennou PlcmtScore")
```

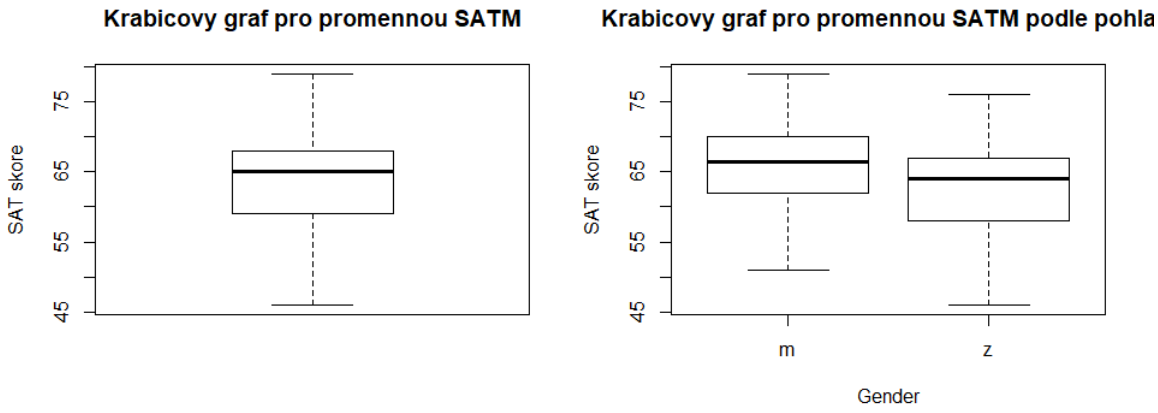




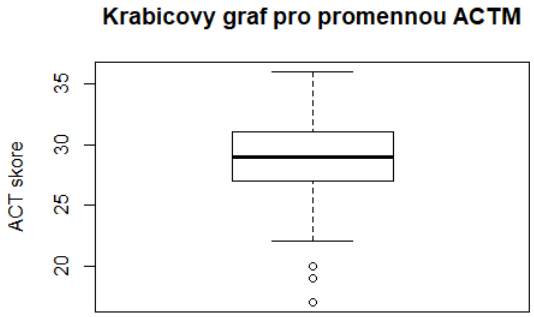
```r
# Vybrane krabicove grafy
boxplot(PSATM,col="white",main="Krabicovy graf pro promennou
PSATM",xlab="",ylab="PSAT skore")

boxplot(PSATM~Gender,col="white",main="Krabicovy graf pro promennou PSATM podle
pohlavi",ylab="PSAT skore")
```

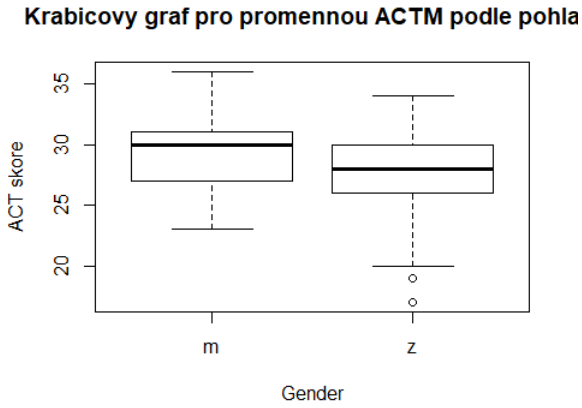



```r
boxplot(SATM,col="white",main="Krabicovy graf pro promennou SATM",xlab="",ylab="SAT
skore")

boxplot(SATM~Gender,col="white",main="Krabicovy graf pro promennou SATM podle
pohlavi",ylab="SAT skore")
```

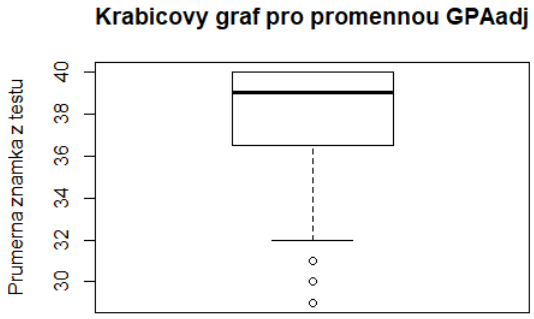


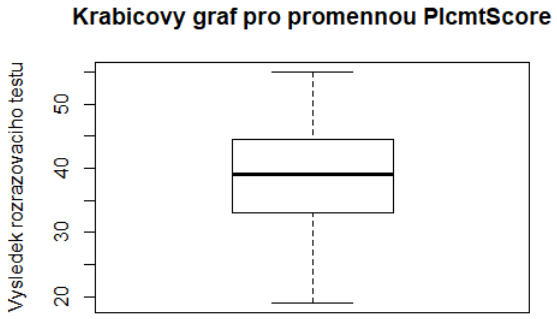
```r
boxplot(ACTM,col="white",main="Krabicovy graf pro promennou ACTM",xlab="",ylab="ACT skore")

boxplot(ACTM~Gender,col="white",main="Krabicovy graf pro promennou ACTM podle pohlavi",ylab="ACT skore")
```






```r
boxplot(GPAadj,col="white",main="Krabicovy graf pro promennou GPAadj",xlab="",ylab="Prumerna znamka z testu")

boxplot(PlcmtScore,col="white",main="Krabicovy graf pro promennou PlcmtScore",xlab="",ylab="Vysledek rozrazovaciho testu")
```

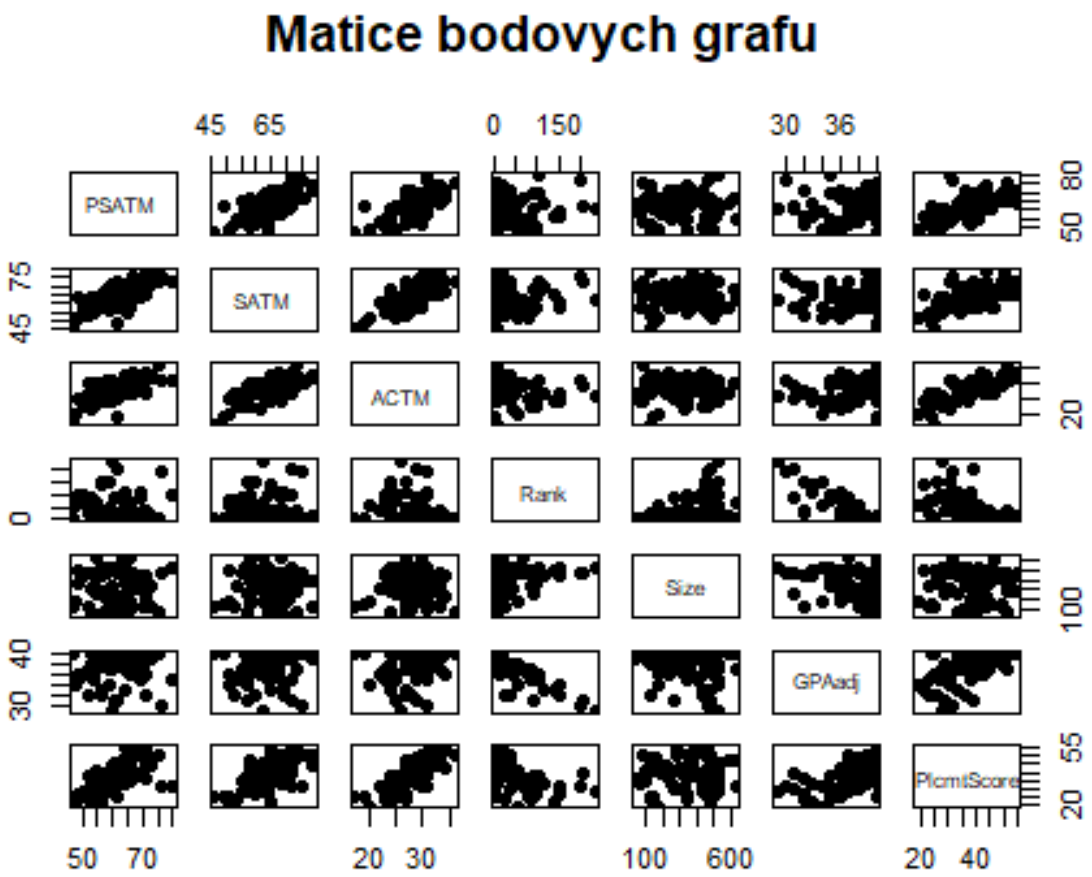




```r
# korelacni matice
cor(ciselne)
```

```
##                  PSATM         SATM        ACTM        Rank          Size
## PSATM       1.00000000  0.702034892  0.67733584 -0.13083570  0.021219974
## SATM        0.70203489  1.000000000  0.66918576 -0.06380615 -0.005190294
## ACTM        0.67733584  0.669185758  1.00000000 -0.22381257  0.079526418
## Rank       -0.13083570 -0.063806146 -0.22381257  1.00000000  0.434336306
## Size        0.02121997 -0.005190294  0.07952642  0.43433631  1.000000000
## GPAadj      0.15671658  0.137467641  0.23753389 -0.86030996 -0.250738582
## PlcmtScore  0.61740751  0.589922674  0.76448447 -0.49662120  0.005064499
##                GPAadj   PlcmtScore
## PSATM       0.1567166  0.617407506
## SATM        0.1374676  0.589922674
## ACTM        0.2375339  0.764484471
## Rank       -0.8603100 -0.496621201
## Size       -0.2507386  0.005064499
## GPAadj      1.0000000  0.565106298
## PlcmtScore  0.5651063  1.000000000
```

```r
# matice bodovych grafu
pairs(ciselne,pch=19,main="Matice bodovych grafu")
```



```r
# kategoricke promenne
cbind("absolutni cetnosti"=table(Gender),"relativni
cetnosti"=round(prop.table(table(Gender)),4))
```

```
##   absolutni cetnosti relativni cetnosti
## m                 36             0.4337
## z                 47             0.5663
```

```r
cbind("absolutni cetnosti"=table(RecTaken),"relativni
cetnosti"=round(prop.table(table(RecTaken)),4))
```

```
##   absolutni cetnosti relativni cetnosti
## 0                 15             0.1807
## 1                 68             0.8193
```

```r
cbind("absolutni cetnosti"=table(TooHigh),"relativni
cetnosti"=round(prop.table(table(TooHigh)),4))
```

```
##   absolutni cetnosti relativni cetnosti
## 0                 60             0.7229
## 1                 23             0.2771
```

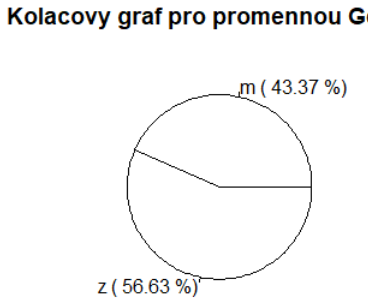
```r
cbind("absolutni cetnosti"=table(TooLow),"relativni
cetnosti"=round(prop.table(table(TooLow)),4))
```

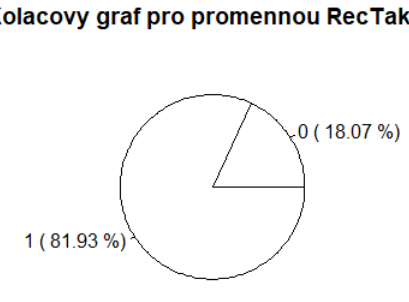
```
##   absolutni cetnosti relativni cetnosti
## 0                 81             0.9759
## 1                  2             0.0241
```

```r
cbind("absolutni cetnosti"=table(CourseSuccess),"relativni
cetnosti"=round(prop.table(table(CourseSuccess)),4))
```

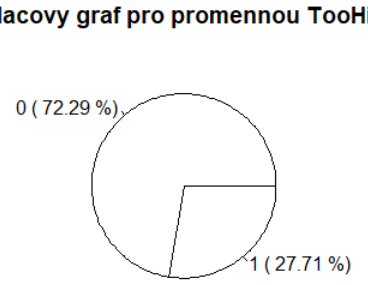
```
##   absolutni cetnosti relativni cetnosti
## 0                  3             0.0361
## 1                 80             0.9639
```

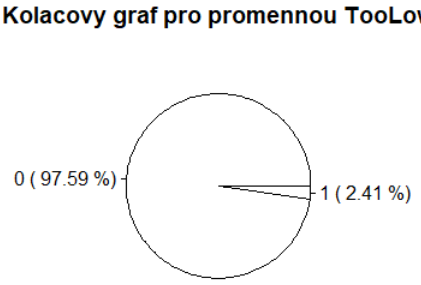
```r
# Kolacove grafy
popis<-paste(sort(unique(Gender)),"(",round(prop.table(table(Gender))*100,2),"%)")
pie(table(Gender),lab=popis,col="white",main="Kolacovy graf pro promennou Gender")

popis<-
paste(sort(unique(RecTaken)),"(",round(prop.table(table(RecTaken))*100,2),"%)")
pie(table(RecTaken),lab=popis,col="white",main="Kolacovy graf pro promennou
RecTaken")
```



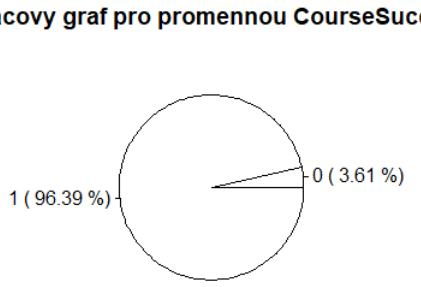



```r
popis<-paste(sort(unique(TooHigh)),"(",round(prop.table(table(TooHigh))*100,2),"%)")
pie(table(TooHigh),lab=popis,col="white",main="Kolacovy graf pro promennou TooHigh")

popis<-paste(sort(unique(TooLow)),"(",round(prop.table(table(TooLow))*100,2),"%)")
pie(table(TooLow),lab=popis,col="white",main="Kolacovy graf pro promennou TooLow")
```






```r
popis<-
paste(sort(unique(CourseSuccess)),"(",round(prop.table(table(CourseSuccess))*100,2),"
%)")
pie(table(CourseSuccess),lab=popis,col="white",main="Kolacovy graf pro promennou
CourseSuccess")
```



```r
# ordinalni promenne
cbind("bezne abs. cetnosti"=table(Recommends),"kumulativni abs.
cetnosti"=cumsum(table(Recommends)),
      "bezne rel. cetnosti"=round(prop.table(table(Recommends)),4),"kumulativni rel.
cetnosti"=cumsum(round(prop.table(table(Recommends)),4)))
```

```
##     bezne abs. cetnosti kumulativni abs. cetnosti bezne rel. cetnosti
## R01                   2                        2              0.0241
## R1                   23                       25              0.2771
## R12                   3                       28              0.0361
## R2                   25                       53              0.3012
## R6                    2                       55              0.0241
## R8                   28                       83              0.3373
##     kumulativni rel. cetnosti
## R01                    0.0241
## R1                     0.3012
## R12                    0.3373
## R2                     0.6385
## R6                     0.6626
## R8                     0.9999
```

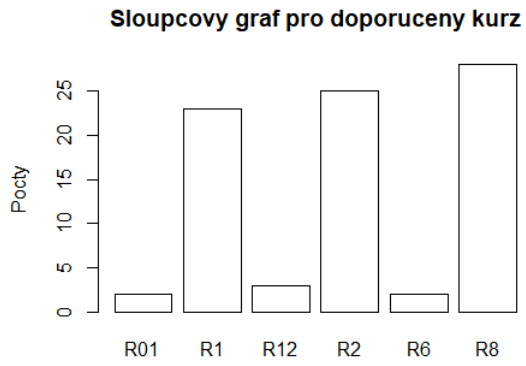
```r
cbind("bezne abs. cetnosti"=table(Course),"kumulativni abs.
cetnosti"=cumsum(table(Course)),
      "bezne rel. cetnosti"=round(prop.table(table(Course)),4),"kumulativni rel.
cetnosti"=cumsum(round(prop.table(table(Course)),4)))
```

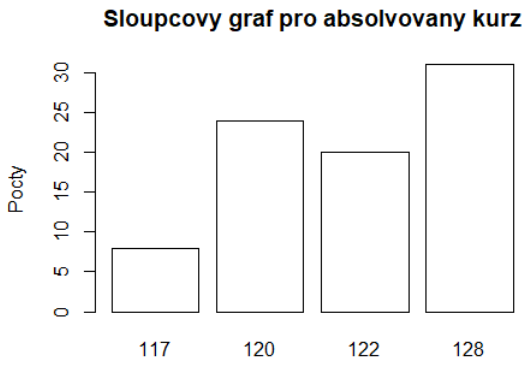
```
##     bezne abs. cetnosti kumulativni abs. cetnosti bezne rel. cetnosti
## 117                   8                        8              0.0964
## 120                  24                       32              0.2892
## 122                  20                       52              0.2410
## 128                  31                       83              0.3735
##     kumulativni rel. cetnosti
## 117                    0.0964
## 120                    0.3856
## 122                    0.6266
## 128                    1.0001
```

```r
cbind("bezne abs. cetnosti"=table(Grade),"kumulativni abs.
cetnosti"=cumsum(table(Grade)),
      "bezne rel. cetnosti"=round(prop.table(table(Grade)),4),"kumulativni rel.
cetnosti"=cumsum(round(prop.table(table(Grade)),4)))
```

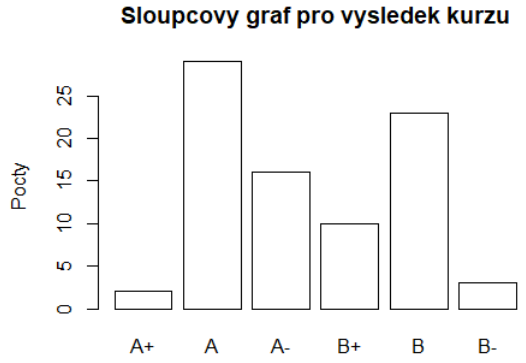
```
##    bezne abs. cetnosti kumulativni abs. cetnosti bezne rel. cetnosti
## A+                   2                        2              0.0241
## A                   29                       31              0.3494
## A-                  16                       47              0.1928
## B+                  10                       57              0.1205
## B                   23                       80              0.2771
## B-                   3                       83              0.0361
##    kumulativni rel. cetnosti
## A+                    0.0241
## A                     0.3735
## A-                    0.5663
## B+                    0.6868
## B                     0.9639
## B-                    1.0000
```

```r
# Sloupcove grafy
barplot(table(Recommends),col="white",main="Sloupcovy graf pro doporuceny
kurz",ylab="Pocty")

barplot(table(Course),col="white",main="Sloupcovy graf pro absolvovany
kurz",ylab="Pocty")
```






```r
barplot(table(Grade),col="white",main="Sloupcovy graf pro vysledek
kurzu",ylab="Pocty")
```




```r
# Kontingencni tabulka pro vysledek kurzu a Pohlavi
addmargins(table(Grade,Gender))
```

```
##       Gender
## Grade  m  z Sum
##   A+   2  0   2
##   A    8 21  29
##   A-  10  6  16
##   B+   4  6  10
##   B   11 12  23
##   B-   1  2   3
##   Sum 36 47  83
```

```r
rbind(prop.table(table(Grade,Gender),2),"Sum"=c(1,1))
```

```
##              m          z
## A+  0.05555556 0.00000000
## A   0.22222222 0.44680851
## A-  0.27777778 0.12765957
## B+  0.11111111 0.12765957
## B   0.30555556 0.25531915
## B-  0.02777778 0.04255319
## Sum 1.00000000 1.00000000
```

```r
plot(table(Grade,Gender),col=c("white","grey"),xlab="",ylab="",main="Vysledek kurzu podle Pohlavi")
```