R instructions for the 2nd seminar

R Instructions for the problem 1:

According to discrete character of variables "ownhh" and "getmar", particular points in scatterplot are covering each other. Soft distortion of the points position may help:

```
foo<-rnorm(n=dim(Household.marriage)[1],sd=1)
plot(Household.marriage$ownhh+foo,Household.marriage$getmar+foo)
```

Smooth curve may give an inside in a relationship between considered variables:

```
scatter.smooth(Household.marriage$ownhh+foo,Household.marriage$getmar+foo)
```

(creates graph plus smoothed curve)

or comfortably:

```
!library(help="DescTools")
plot(Household.marriage$ownhh,Household.marriage$getmar)
AddLoess(Household.marriage$ownhh,Household.marriage$getmar)
```

(adds "loess" to existing plot)

R Instructions for the problem 2:

Significance test for Kendall's tau b:

```
cor.test(Household.marriage$ownhh,Household.marriage$getmar,method="kendall")
```

Significance test for Spearman correlation coefficient:

```
cor.test(Household.marriage$ownhh,Household.marriage$getmar,method="spearman",exact=F)
```

Pearsonχ^2 test :

```
t<-table(Household.marriage$ownhh , Household.marriage$getmar); t
chisq.test(t)
```

The measures of association:

```
!library(help="DescTools")
KendallTauB(Household.marriage$ownhh,Household.marriage$getmar)
StuartTauC(Household.marriage$ownhh,Household.marriage$getmar)
```

(in a lecture τ_c)

```
SomersDelta(Household.marriage$ownhh,Household.marriage$getmar,direction="row")
```

$d(X|Y)$

```
SomersDelta(Household.marriage$ownhh,Household.marriage$getmar,direction="column")
```

$d(Y|X)$ (pairs which doesn't have X ties; $Y \sim X$

```
SpearmanRho(Household.marriage$ownhh,Household.marriage$getmar)
GoodmanKruskalGamma(Household.marriage$ownhh,Household.marriage$getmar)
CramerV(Household.marriage$ownhh,Household.marriage$getmar)
```

R Instructions for the problem 3:

•histograms and boxplots (both variables in one picture)

```
boxplot(Household.marriage$ownhh, Household.marriage$getmar)
hist(Household.marriage$getmar,col=rgb(1,0,0,0.15),freq=F,breaks=seq(-0.5,5.5,by=1))
hist(Household.marriage$ownhh,col=rgb(0,0,1,0.15),freq=F,breaks=seq(-0.5,5.5,by=1),add=T
```

or: `plot(as.factor(Household.marriage$ownhh), col=rgb(0,0,1,0.15))`

```
plot(as.factor(Household.marriage$getmar), col=rgb(1,0,0,0.15),add=T)
```

•descriptive statistics for "difference" variable

Firstly, new variable *dif=ownhh-getmar* is set.

```
Household.marriage$dif<-(Household.marriage$ownhh-Household.marriage$getmar)
```

Descriptive statistics and confidence intervals for the new variable *dif*:

```
table(Household.marriage$dif)
!library(help="DescTools")
MeanCI(Household.marriage$dif)
MedianCI(Household.marriage$dif)
VarCI(Household.marriage$dif)
```

Graphs for the new variable *dif*:

`plot(as.factor(Household.marriage$dif), col=rgb(1,0,0,0.15))` (notice that histogram is symetric which is an assumption of Wilkox signed rank test)

```
boxplot(Household.marriage$dif,col=rgb(1,0,0,0.15))
```

•paired t-test

```
t.test(Household.marriage$ownhh, Household.marriage$getmar,paired=T)
```

•paired Wilcoxon sign rank test

```
!library(exactRankTests)
wilcox.exact(Household.marriage$ownhh, Household.marriage$getmar,paired=T)
```

R Instructions for the problem 4:

A description of variables in a spreadsheet *Criminality* can be obtained by `comment(Criminality)`

Pairs of variables:

•correlation matrices

```
x<-cor(Criminality[2:8],use="pairwise.complete.obs")
```

•covariance matrices

```
cov(Criminality[2:8],use="pairwise.complete.obs")
```

•scatterplot matrix

Scatterplot matrix with lowess line:

```
pairs(Criminality[2:8],panel=panel.smooth)
```

Scatterplot matrix with regression line and histograms:

```
!library(car)
scatterplotMatrix(Criminality[2:8],diagonal="histogram",smooth=FALSE,col=c(2,1,4))
```

Visualizing the strength of correlations in correlation matrix:

```
!library(help="DescTools")
PlotCorr(x)
```

```
!library(ellipse)
plotcorr(x)
```

Multidimensional vizualization:

```
!library(help="DescTools")
PlotFaces(Criminality[2:8])
```

plots Chernoff faces