Task p. 50 / Anwendung S. 50

FK

automatic

Working directory

```
> setwd("D:/kronthafranz/Documents/01Lehre/06Quantitative Forschungsmethoden
dt en")
```

Load data

```
> load("D:/kronthafranz/Documents/01Lehre/06Quantitative Forschungsmethoden
dt en/04Parametric and nonparametric testing/siqss.RData")
```

Generate difference variable (di)

```
> siqss$di <- with(siqss, emrec - emsent)
```

Descriptive statistics

```
> numSummary(siqss[,c("emrec", "emsent"), drop=FALSE], statistics=c("mean",
"sd",
+   "quantiles", "skewness", "kurtosis"), quantiles=c(0,.25,.5,.75,1),
type="2")

           mean       sd skewness  kurtosis 0% 25% 50% 75% 100%   n  NA
emrec   19.66667 26.98499 3.081698 12.161726  0   4  10  25  177 240 534
emsent  10.87983 15.73578 2.563809  8.659816  0   2   4  13  100 233 541
```
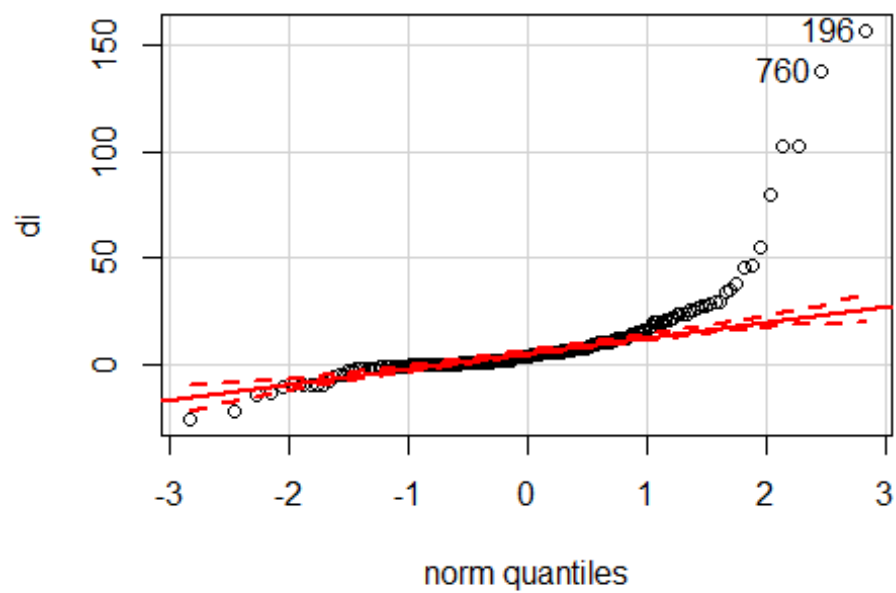
Normal distribution (di)

```
> with(siqss, Hist(di, scale="frequency", breaks="Sturges", col="darkgray"))
```
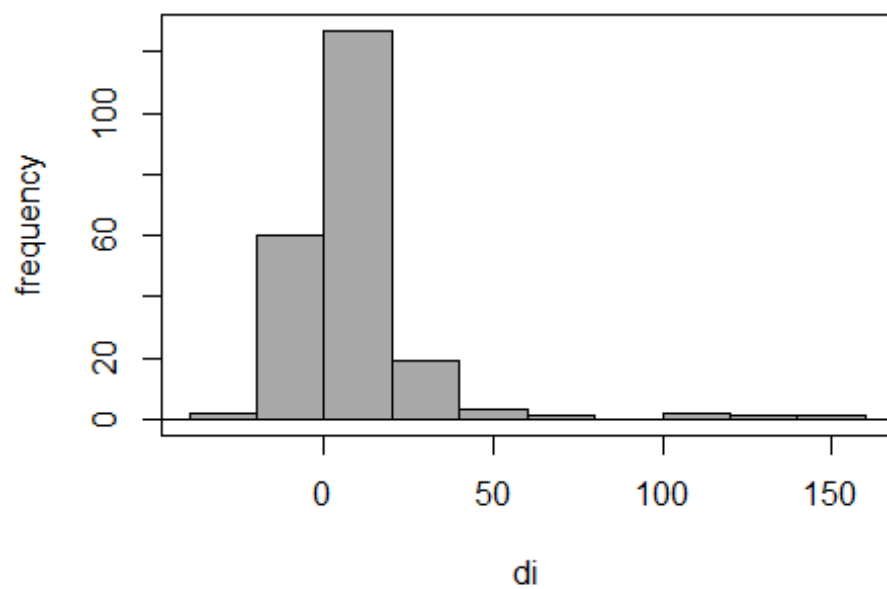
```
> with(siqss, qqPlot(di, dist="norm", id.method="y", id.n=2,
labels=rownames(siqss)))
```



```
196 760
216 215
```

```
> normalityTest(~di, test="shapiro.test", data=siqss)


    Shapiro-Wilk normality test

data:  di
W = 0.57341, p-value < 2.2e-16
```

t-Test dependent samples

```
> with(siqss, (t.test(emrec, emsent, alternative='two.sided', conf.level=.95,
+    paired=TRUE)))


    Paired t-test

data:  emrec and emsent
t = 6.2244, df = 215, p-value = 0.000000002498
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
  5.830469 11.234346
sample estimates:
mean of the differences
             8.532407
```

Wilcoxon Signed-Rank Test

```
> with(siqss, median(emrec - emsent, na.rm=TRUE)) # median difference

[1] 3

> with(siqss, wilcox.test(emrec, emsent, alternative='two.sided',
paired=TRUE))


    Wilcoxon signed rank test with continuity correction

data:  emrec and emsent
V = 15533, p-value < 2.2e-16
alternative hypothesis: true location shift is not equal to 0
```

Interpretation:

Testvariable is not normally distributed

Sample is not large, better to use the Wilcoxon Signed-Rank Test (however, both tests come to the same result)

H0 is rejected, number e-mails received and e-mails sent differ