Assignment5

```
Northeast <- c(25.3,25.3,18.2,18.3,16.3)
Northcentral <- c(32.1,29.0,18.8,24.3,19.0)
South <- c(38.8,31.0,19.3,15.7,16.8)
West <- c(25.4,21.1,20.3,24.0,17.5)

Infant_Mortality <- matrix(data= c(Northeast,Northcentral,South,West),nrow=4,
ncol=5)

rownames(Infant_Mortality) <- c("Northeast","Northcentral","South","West")
colnames(Infant_Mortality) <- c("<8","9-11","12","13-15",">16")

twoway.median <- function(mat) {
  # first row then column
  meff.MP <- median(mat)
  aeff.MP <- apply(mat,1,median,na.rm=T)  # row medians
  mat.res <- mat - matrix(rep(aeff.MP,each=ncol(mat)),byrow=T,ncol=ncol(mat))
;
  beff.MP <- apply(mat.res,2,median,na.rm=T) # column effect
  aeff.MP <- aeff.MP - median(aeff.MP)  # row effect
  res.MP <- mat.res - matrix(rep(beff.MP,each=nrow(mat)),byrow=F,nrow=nrow(ma
t))
  list(overall=meff.MP, row=aeff.MP, col=beff.MP, res=res.MP)
  }

med_Infant1 <- twoway.median(Infant_Mortality)
med_Infant2 <- twoway.median(med_Infant1$res)
med_Infant2
```

```
## $overall
## [1] 0
##
## $row
##    Northeast Northcentral        South         West
##          0.0          0.0          0.0         -1.3
##
## $col
##    <8  9-11    12 13-15   >16
##  0.65  0.65  0.65  0.00  0.00
##
## $res
##                <8  9-11    12 13-15 >16
## Northeast     1.7 -7.95 -5.15   1.4   0
## Northcentral  2.5  8.65 -9.65  -1.4   0
## South        -8.3  1.85  6.45  -4.0   0
## West         -1.7 -1.85  5.15  11.1   0
```

```r
Infant_Mortality <- rbind(med_Infant2$res,med_Infant2$col)
Infant_Mortality <- cbind(Infant_Mortality,med_Infant2$row)
```

```
## Warning in cbind(Infant_Mortality, med_Infant2$row): number of rows of
## result is not a multiple of vector length (arg 2)
```

```r
Infant_Mortality[5,6] <- med_Infant2$overall
```

```r
library("stats")
#2a)

Food_Tobacco <- c(22.2,44.5,59.6,73.2,86.8)
HouseHold <- c(10.5,15.5,29,36.5,46.2)
Medical_Health <- c(3.53,5.76,9.71,14.0,21.1)
Personal_care <- c(1.04,1.98,2.45,3.40,5.40)
Educ_research <- c(.641,.974,1.80,2.60,3.64)

expenditure <- matrix(data = c(Food_Tobacco,HouseHold,Medical_Health,Personal
_care,Educ_research),nrow=5,ncol=5)
colnames(expenditure) <- seq(1940,1960,5)
rownames(expenditure) <- c("Food_Tobacco","HouseHold","Medical_Health","Perso
nal_care","Educ_research")
med_expen <- medpolish(expenditure)
```

```
## 1: 139.595
## Final: 139.595
```

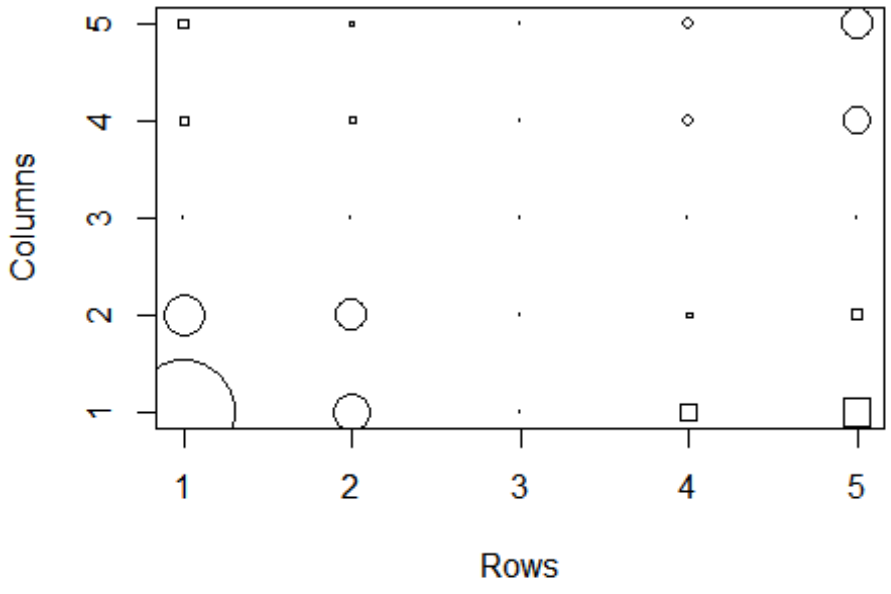
```r
print(med_expen)
```

```
##
## Median Polish Results (Dataset: "expenditure")
##
## Overall: 9.71
##
## Row Effects:
##   Food_Tobacco      HouseHold Medical_Health  Personal_care  Educ_research
##          -6.18          -3.95           0.00           4.29          11.39
##
## Column Effects:
##  1940  1945  1950  1955  1960
## 49.89 19.29  0.00 -7.26 -7.91
##
## Residuals:
##                  1940   1945 1950  1955   1960
## Food_Tobacco   -31.22 -12.32    0  4.77  5.021
## HouseHold      -11.15  -9.55    0  3.48  3.124
## Medical_Health   0.00   0.00    0  0.00  0.000
## Personal_care    9.31   3.21    0 -3.34 -3.490
## Educ_research   15.81   5.81    0 -8.44 -9.550
```

```r
abs_sum_residuals <- sum(abs(med_expen$residuals))


AnalogR2 <- 1 - (abs_sum_residuals/(sum(abs(expenditure - med_expen$overall))
))

print (AnalogR2)
```

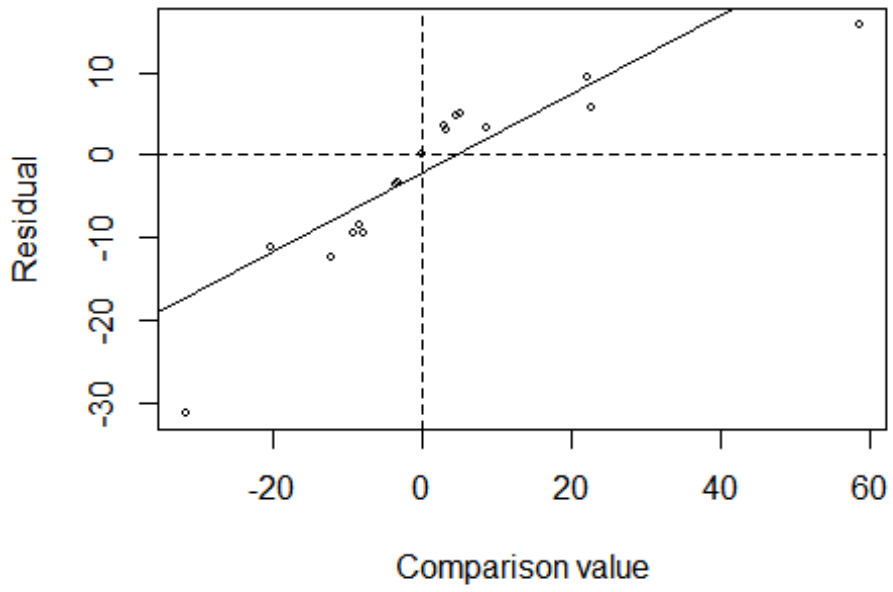
```
## [1] 0.6722237
```

```r
#2b)
plot(NA,NA,type="n",xlim=c(1, 5),ylim=c(1, 5),xlab="Rows",ylab ="Columns")
for (i in 1:nrow(med_expen$residuals)){
  for (j in 1:ncol(med_expen$residuals)){
    if (med_expen$residuals[i,j]>0) {
      symbols(i,j,squares=abs(med_expen$residuals[i,j]/100),inches=FALSE,add=
T)
    }
    else {
      symbols(i,j,circles=abs(med_expen$residuals[i,j]/100),inches=FALSE,add=
T)
    }
  }
}
```




```r
#2C
source('E:/Study stuff/Subjects and courses/S 670 Exploratory Data Analysis/P
```

```
rof R code/rrline.r')

# diagnostic plot
med_expen.comp <- matrix(med_expen$row,ncol=1) %*%
  matrix(med_expen$col,nrow=1)/med_expen$overall
plot(med_expen.comp, med_expen$res,xlab="Comparison value",ylab="Residual",ce
x=0.5)
abline(v=0,h=0,lty=2)
#abline(0,-1,col="red")
abline(lm(c(med_expen$res)~c(med_expen.comp)))
```




```
#run.rrline(med_expen.comp,med_expen$res,iter=10)

#2D

lexpenditure <- log(expenditure)
#lexpenditure <- matrix(lexpenditure,nrow=5,ncol=5)
#rownames(expenditure) <- c("Food_Tobacco","HouseHold","Medical_Health","Pers
onal_care","Educ_research")
Med_lexpenditure <- medpolish(lexpenditure)

## 1: 1.925217
## 2: 1.766743
## Final: 1.766743

print (Med_lexpenditure)
```

```
##
## Median Polish Results (Dataset: "lexpenditure")
##
## Overall: 2.273156
##
## Row Effects:
##   Food_Tobacco      HouseHold Medical_Health  Personal_care  Educ_research
##     -0.9875633     -0.5222188      0.0000000      0.3342534      0.7248511
##
## Column Effects:
##       1940       1945       1950       1955       1960
##  1.8144993  0.9899025  0.0000000 -1.3116084 -1.7060237
##
## Residuals:
##                    1940     1945      1950      1955      1960
## Food_Tobacco    0.00000  0.07588 -0.024295  0.065236 -0.024295
## HouseHold       0.23005  0.00000  0.000000  0.243768 -0.071258
## Medical_Health  0.00000  0.10424  0.000000 -0.065460  0.020654
## Personal_care  -0.12871  0.00000  0.031648 -0.072026  0.054125
## Educ_research  -0.34890 -0.15493  0.051266  0.000000  0.000000
```

```
MedianPolishdata <- rbind(lexpenditure,Med_lexpenditure$col)
MedianPolishdata <- cbind(MedianPolishdata,Med_lexpenditure$row)
```

```
## Warning in cbind(MedianPolishdata, Med_lexpenditure$row): number of rows o
f
## result is not a multiple of vector length (arg 2)
```

```
colnames(MedianPolishdata)[6] <- "col effect"
row.names(MedianPolishdata) [6] <- "Row effect"
MedianPolishdata[6,6] <- Med_lexpenditure$overall

print (MedianPolishdata)
```

```
##                    1940      1945     1950        1955        1960
## Food_Tobacco   3.100092 2.3513753 1.261298  0.03922071 -0.44472582
## HouseHold      3.795489 2.7408400 1.750937  0.68309684 -0.02634398
## Medical_Health 4.087656 3.3672958 2.273156  0.89608802  0.58778666
## Personal_care  4.293195 3.5973123 2.639057  1.22377543  0.95551145
## Educ_research  4.463607 3.8329798 3.049273  1.68639895  1.29198368
## Row effect     1.814499 0.9899025 0.000000 -1.31160842 -1.70602369
##                col effect
## Food_Tobacco   -0.9875633
## HouseHold      -0.5222188
## Medical_Health  0.0000000
## Personal_care   0.3342534
## Educ_research   0.7248511
## Row effect      2.2731563
```

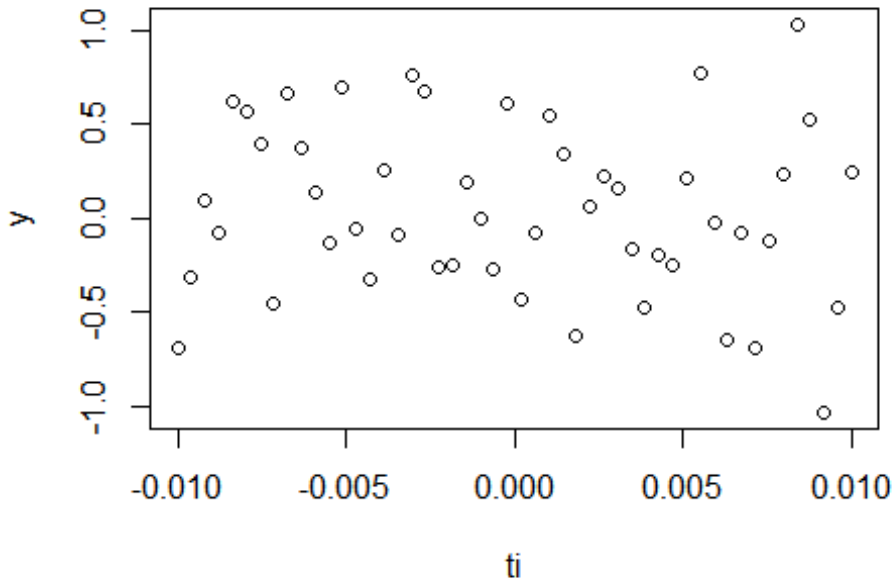
```
abs_sum_residuals <- sum(abs(Med_lexpenditure$residuals))
```

```
AnalogR21 <- 1 - (abs_sum_residuals/(sum(abs(lexpenditure - Med_lexpenditure$
overall))))

print (AnalogR21)
```

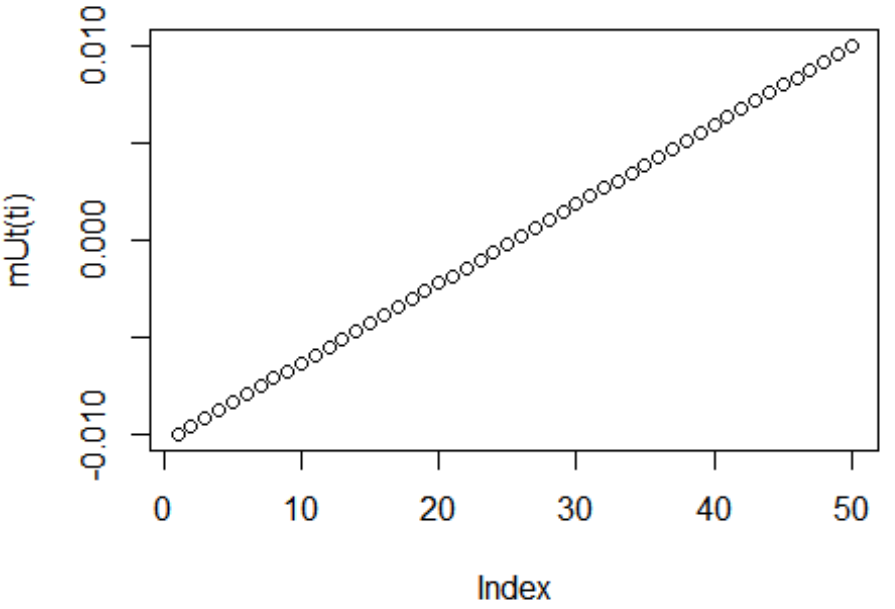
```
## [1] 0.9437578
```

```
#2E)
source('E:/Study stuff/Subjects and courses/S 670 Exploratory Data Analysis/P
rof R code/myplotfit.r')

#prmedpol(lexpenditure)
#myplotfit(lexpenditure)
```

```
mUt<- function(dp){
  return (dp + 0.5 * (exp(-50*(dp-0.5)^2)))
}

x<- seq(0,1,length.out=50)

f<-function(t){ (2 * t - 1)/100}

ti<- f(x)

error <- rnorm(50,0,0.5)
y<-mUt(ti)+error

data<- cbind(ti,y)

plot(data)
```


y
1.0
0.5
0.0
-0.5
-1.0
-0.010
-0.005
0.000
0.005
0.010
ti

```
plot(mUt(ti))
```


mUt(ti)
0.010
0.000
-0.010
0
10
20
30
40
50
Index

```r
M2 <- 1
Rk <- 1/(2*sqrt(pi))
signma_square <- 0.5^2

n <- 50
expressionMu<- expression(t + 0.5 * (exp(-50*(t-0.5)^2)))
J2u <- D(D(expressionMu,'t'),'t')

func <- function(t){( -(0.5 * (exp(-50 * ((t - 0.5)^2)) * (50 * 2) - exp(-50
* ((t - 0.5)^2)) * (50 * (2 * (t - 0.5))) * (50 * (2 * (t - 0.5))))))^2}
integratefunc <- integrate(func,lower = 0, upper = 1 )
inte_func_value <- integratefunc$value

optimum_lamda<-(n^(-1/5))*(((signma_square)*Rk)/(inte_func_value*(M2^2)))^1/5
plot(x,y)
lines(ksmooth(x,y,kernel="normal",bandwidth=0.08))
```