

solution_part_2_code.R

spinoza

2021-04-30

```
#### You may need to change the data file directory accordingly.
```

```
##### Q1
```

```
#a
```

```
Employee=read.table(file="EmployeeData.txt",header=T)
```

```
attach(Employee)
```

```
lm.res=lm(metal~vendor)
```

```
summary(lm.res)
```

```
##
```

```
## Call:
```

```
## lm(formula = metal ~ vendor)
```

```
##
```

```
## Residuals:
```

```
##      Min       1Q   Median       3Q      Max
```

```
## -3.2348 -1.2393 -0.0311  1.0022  3.7077
```

```
##
```

```
## Coefficients:
```

```
##              Estimate Std. Error t value Pr(>|t|)
```

```
## (Intercept) 2.847911    3.299962   0.863   0.392
```

```
## vendor      0.122442    0.009423  12.994 <2e-16 ***
```

```
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
##
```

```
## Residual standard error: 1.59 on 58 degrees of freedom
```

```
## Multiple R-squared:  0.7443, Adjusted R-squared:  0.7399
```

```
## F-statistic: 168.8 on 1 and 58 DF,  p-value: < 2.2e-16
```

```
anova(lm.res)
```

```
## Analysis of Variance Table
```

```
##
```

```
## Response: metal
```

```
##              Df Sum Sq Mean Sq F value    Pr(>F)
```

```
## vendor         1  426.72   426.72  168.83 < 2.2e-16 ***
```

```
## Residuals    58  146.59     2.53
```

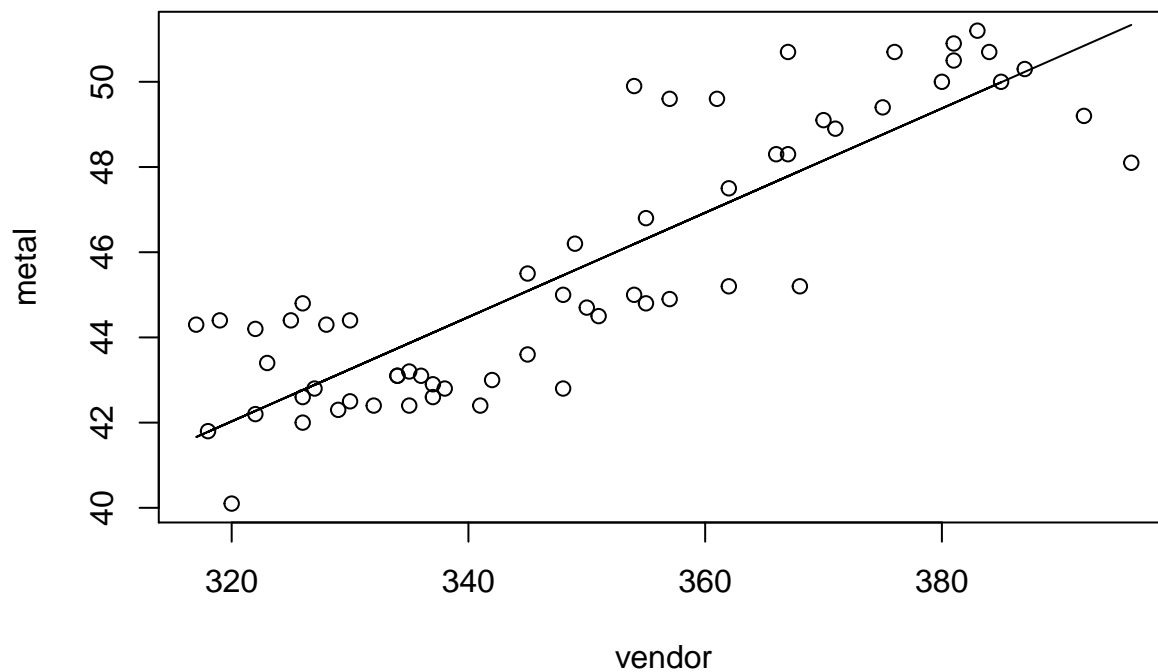
```
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
#b
```

```
plot(vendor,metal)
```

```
lines(vendor,fitted(lm.res))
```



```
#c  
plot(time,resid(lm.res))
```

```
#d  
library(lmtest)
```

```
## Loading required package: zoo
```

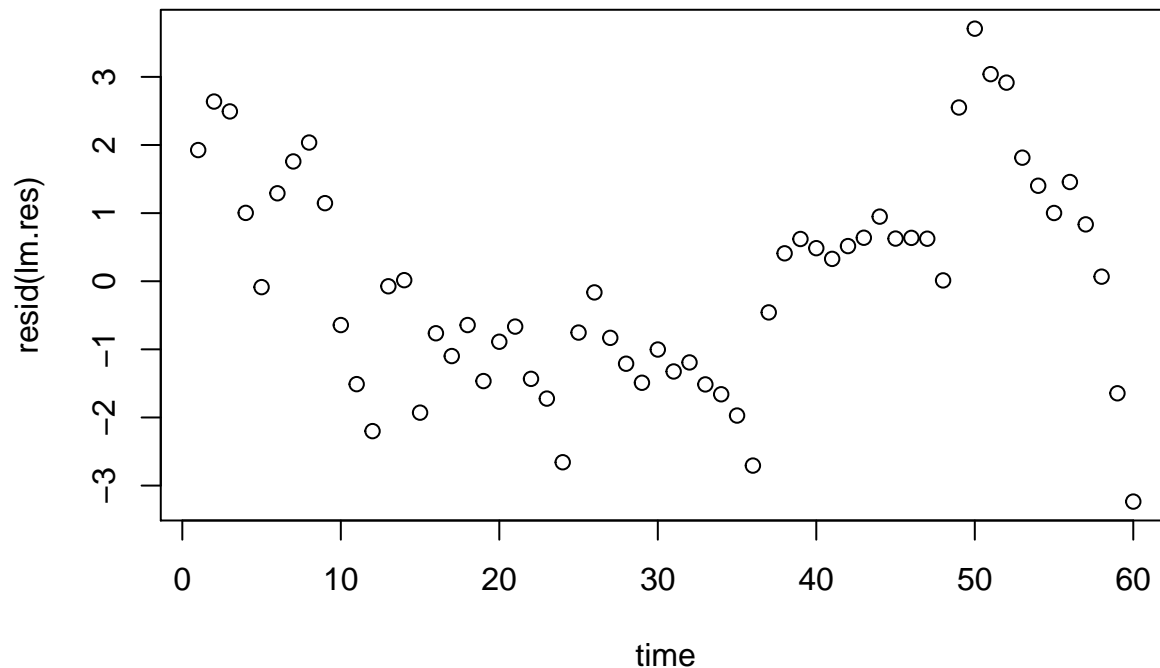
```
##
```

```
## Attaching package: 'zoo'
```

```
## The following objects are masked from 'package:base':
```

```
##
```

```
## as.Date, as.Date.numeric
```



```
dwtest(metal~vendor)
```

```
##
## Durbin-Watson test
##
## data: metal ~ vendor
## DW = 0.35924, p-value < 2.2e-16
## alternative hypothesis: true autocorrelation is greater than 0
## p-value < 2.2e-16, residuals are correlated
```

```
#e
N=nrow(Employee)
phi.hat=lm(lm.res$residual[1:N-1]~0+lm.res$residual[2:N])$coeff
y.trans=metal[2:N]-phi.hat*metal[1:N-1]
x.trans=vendor[2:N]-phi.hat*vendor[1:N-1]

coch=lm(y.trans~x.trans)
summary(coch)
```

```
##
## Call:
## lm(formula = y.trans ~ x.trans)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.2310 -0.4985  0.1475  0.4613  1.4703
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   5.29205    0.96201   5.501 9.29e-07 ***
## x.trans       0.05769    0.01297   4.448 4.07e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
##
## Residual standard error: 0.7707 on 57 degrees of freedom
## Multiple R-squared:  0.2577, Adjusted R-squared:  0.2446
## F-statistic: 19.78 on 1 and 57 DF,  p-value: 4.07e-05
# Larger. The standard error of the estimate of beta1 from Cochran procedure is 0.01297 while the one

##### Q2

#a

price=read.table(file="HomePrice.txt",header=T)

attach(price)

ols.res=lm(SalesPrice~homeft2+lotft2)
summary(ols.res)

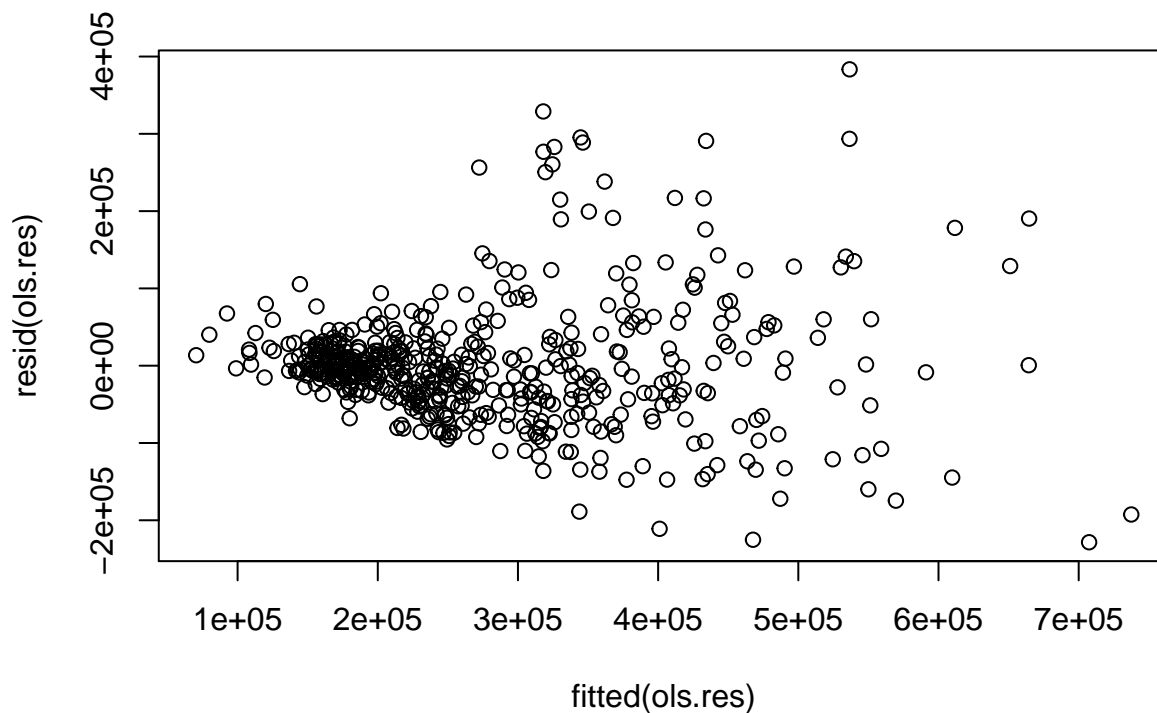
##
## Call:
## lm(formula = SalesPrice ~ homeft2 + lotft2)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -228421  -38178   -5506   25494  383423
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -1.027e+05  1.265e+04  -8.121 3.39e-15 ***
## homeft2      1.560e+02  4.871e+00  32.019 < 2e-16 ***
## lotft2       1.151e+00  2.964e-01   3.882 0.000117 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 78070 on 519 degrees of freedom
## Multiple R-squared:  0.6808, Adjusted R-squared:  0.6796
## F-statistic: 553.5 on 2 and 519 DF,  p-value: < 2.2e-16

anova(ols.res)

## Analysis of Variance Table
##
## Response: SalesPrice
##           Df      Sum Sq    Mean Sq  F value    Pr(>F)
## homeft2     1 6.6555e+12  6.6555e+12 1091.875 < 2.2e-16 ***
## lotft2      1 9.1880e+10  9.1880e+10   15.073 0.0001168 ***
## Residuals 519 3.1635e+12  6.0955e+09
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

#b

plot(fitted(ols.res),resid(ols.res))
```



```
#c
r.abs=abs(resid(ols.res))
r.fitted=lm(r.abs~fitted(ols.res))$fitted.values
```

```
#d
w=1/(r.fitted^2)
```

```
wls.res=lm(SalesPrice~homeft2+lotft2,weights=w)
summary(wls.res)
```

```
##
## Call:
## lm(formula = SalesPrice ~ homeft2 + lotft2, weights = w)
##
## Weighted Residuals:
##      Min       1Q   Median       3Q      Max
## -9.4644 -0.9364 -0.2118  0.6141  8.0706
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -8918.7876  3619.3749  -2.464   0.0141 *
## homeft2      123.1438    3.3186   37.107 <2e-16 ***
## lotft2       -0.1274    0.2300   -0.554   0.5799
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.528 on 519 degrees of freedom
## Multiple R-squared:  0.7717, Adjusted R-squared:  0.7708
## F-statistic: 877.2 on 2 and 519 DF,  p-value: < 2.2e-16
```

```
anova(wls.res)
```

```
## Analysis of Variance Table
```

```
##
```

```
## Response: SalesPrice
```

```
##
```

```
## Df Sum Sq Mean Sq F value Pr(>F)
```

```
## homeft2 1 4095.8 4095.8 1754.0376 <2e-16 ***
```

```
## lotft2 1 0.7 0.7 0.3068 0.5799
```

```
## Residuals 519 1211.9 2.3
```

```
## ---
```

```
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
#e
```

```
plot(fitted(wls.res),resid(wls.res))
```

