

MATH 588

HW4

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Question 1

a

```
library(Sleuth3)
bb = case1102
sapply(bb, class) # Simplify future typeing by changing names to lower case:

##      Brain      Liver      Time Treatment      Days      Sex      Weight      Loss
## "integer" "integer" "numeric" "factor" "integer" "factor" "integer" "numeric"
##      Tumor
## "integer"

names(bb) = casefold(names(bb))
names(bb)

## [1] "brain"      "liver"      "time"      "treatment" "days"      "sex"
## [7] "weight"      "loss"      "tumor"

# Make new variables
bb$logBLratio = log(bb$brain/bb$liver)
bb$logTime = log(bb$time)

# a(1)
library(dplyr)
with(bb, table(sex)) %>% prop.table()

## sex
##      Female      Male
## 0.7647059 0.2352941

# a(2)
with(bb, table(treatment,days)) %>% prop.table()

##      days
## treatment      9      10      11
##      BD 0.02941176 0.41176471 0.05882353
##      NS 0.05882353 0.38235294 0.05882353
```

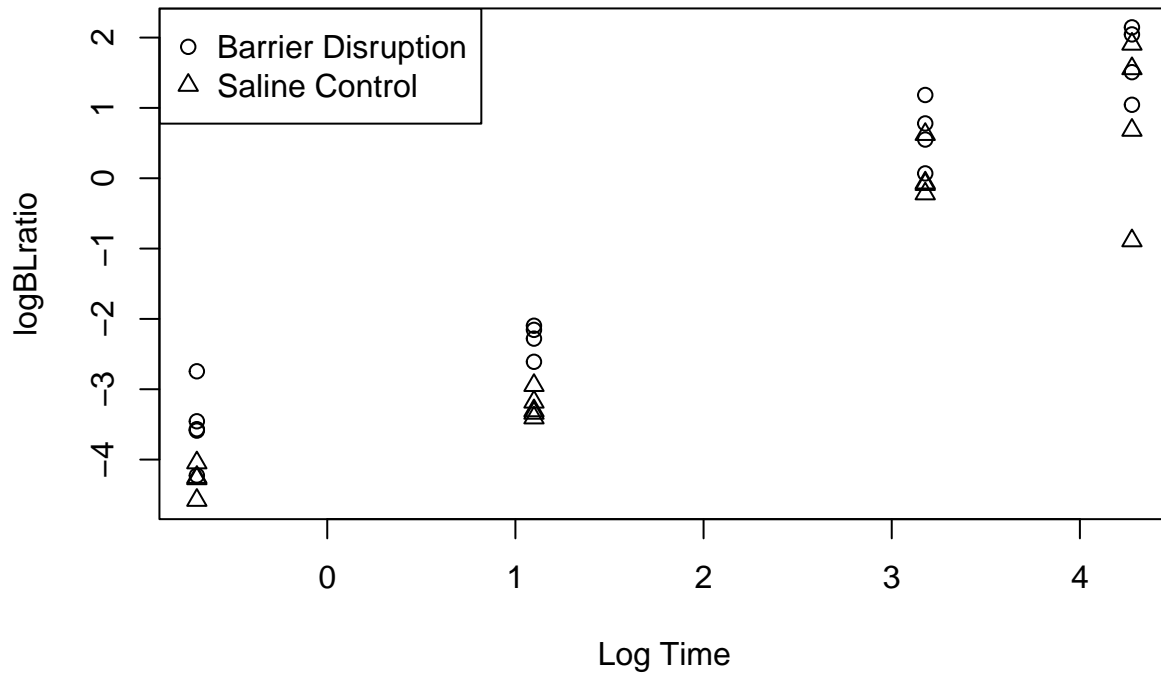
b

```
# b

# Plot key variables
with(bb, plot(logBLratio ~ logTime, pch=as.numeric(bb$treat), xlab="Log Time"))
with(bb, table(bb$treat,as.numeric(bb$logTime)))

##
##      1  2
## BD 17  0
## NS  0 17

legend("topleft", legend=c("Barrier Disruption","Saline Control"), pch=1:2)
```



c

```
m0 = lm(logBLratio ~ logTime + treatment, bb)
summary(m0)

##
## Call:
## lm(formula = logBLratio ~ logTime + treatment, data = bb)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.7280 -0.4453  0.1078  0.3556  1.0673
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -3.00928    0.18400 -16.355 < 2e-16 ***
## logTime      1.09784    0.05654  19.416 < 2e-16 ***
## treatmentNS -0.84579    0.21640  -3.908 0.000471 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.6307 on 31 degrees of freedom
## Multiple R-squared:  0.9261, Adjusted R-squared:  0.9213
## F-statistic: 194.2 on 2 and 31 DF, p-value: < 2.2e-16
```

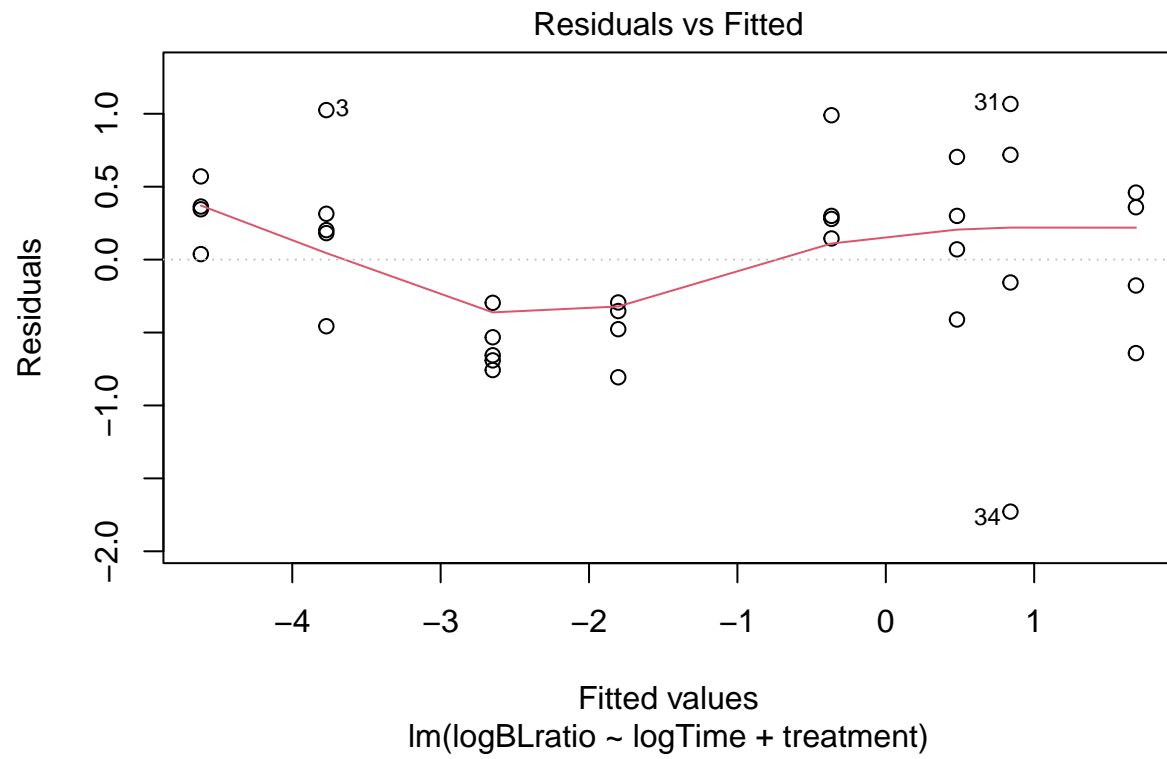
d

```
m1 = lm(logBLratio ~ logTime*treatment, bb)
summary(m1)

##
## Call:
## lm(formula = logBLratio ~ logTime * treatment, data = bb)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.7635 -0.4631  0.1076  0.3907  1.0318
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   -2.98457    0.21145  -14.11 8.74e-15 ***
## logTime        1.08417    0.07933   13.67 2.02e-14 ***
## treatmentNS   -0.89928    0.30693   -2.93 0.00642 **
## logTime:treatmentNS  0.02870    0.11497    0.25 0.80458
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.6404 on 30 degrees of freedom
## Multiple R-squared:  0.9262, Adjusted R-squared:  0.9189
## F-statistic: 125.6 on 3 and 30 DF,  p-value: < 2.2e-16
```

e

```
plot(m0, which=c(1,1))
```



```
plot(m1, which=c(1,1))
```

