Chapter 2

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library(Stat2Data)  
data("MetabolicRate")  
head (MetabolicRate)

## Computer BodySize LogBodySize Instar CO2ppm Mrate LogMrate  
## 1 1 0.0021 -2.677781 1 2.875 0.18652543 -0.7292620  
## 2 1 0.0096 -2.017729 1 2.201 0.20399768 -0.6903748  
## 3 1 0.0060 -2.221849 1 0.965 0.08952349 -1.0480630  
## 4 1 0.0059 -2.229148 1 3.820 0.35107971 -0.4545943  
## 5 1 0.0061 -2.214670 1 6.106 0.36291150 -0.4401993  
## 6 1 0.0076 -2.119186 1 2.449 0.17659516 -0.7530212

Let us create a model as asked in 2.24:

model = lm (LogBodySize ~ LogMrate, data=MetabolicRate)  
summary (model)

##   
## Call:  
## lm(formula = LogBodySize ~ LogMrate, data = MetabolicRate)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.53362 -0.12886 0.00303 0.11205 0.52210   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) -1.38990 0.01381 -100.7 <2e-16 \*\*\*  
## LogMrate 1.03429 0.01394 74.2 <2e-16 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.1861 on 303 degrees of freedom  
## Multiple R-squared: 0.9478, Adjusted R-squared: 0.9477   
## F-statistic: 5505 on 1 and 303 DF, p-value: < 2.2e-16

2.24 A) LogBodySize = -1.39 + 1.03 LogMrate 2.24 B) The slope parameter is significant! Generally speaking, I’d calculate t-stat, then p-val of that t-stat from DF. However, R provides ‘Signif Codes’, and the summary of the model inidicates that the slope parameter is significant. 2.24 D) Model sum of squares is SSM and the Total sum of squares is SST. Since R^2 is SSM/SST, then the answer is 0.9478. The larger this value, the better the model explains the relationship between the Y and X variables.

2.50 A) When LogBodySize is 0 then LogMrate is (139/103). Got the LogMrate value by solving for 0 = -1.39 + 1.03 LogMrate. Then, Mrate = 22.36 μW 2.50 B) Predicted interval = -1.38 (+/-) (-100.7\*0.01381) The 95% PI will be (-2.781334, 0)

[Confused about the 2.50 B answer, suspect it is incorrect: trying to understand the process from 2.4]