Homework 6 solution

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```
#Question 1
library(tidyverse)
```

```
## -- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
## v dplyr     1.1.4     v readr     2.1.5
## v forcats   1.0.0     v stringr   1.5.1
## v ggplot2   3.5.1     v tibble    3.2.1
## v lubridate 1.9.4     v tidyr     1.3.1
## v purrr     1.0.2
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
```

```
library(ggplot2)
library(nlme)
```

```
##
## Attaching package: 'nlme'
##
## The following object is masked from 'package:dplyr':
##
##     collapse
```

```
library(multcomp)
```

```
## Loading required package: mvtnorm
## Loading required package: survival
## Loading required package: TH.data
## Loading required package: MASS
##
## Attaching package: 'MASS'
##
## The following object is masked from 'package:dplyr':
##
##     select
##
##
## Attaching package: 'TH.data'
##
## The following object is masked from 'package:MASS':
##
##     geyser
```

```r
Subjects<-c(1:5, 1:5,1:5,6:10,6:10,6:10)
Drug<-rep(c("A","B"), each = 15)
Timing<-rep(c("RightAfter","OneYear","FiveYear"), each=5)
ODX<-c(22, 16,23,25,26,20,12,11,14,18,15,10,10,12,16,25,20,35,39,27,21,18,27,35,27,21,19,26,36,25)
cancerdata<-data.frame(Subjects, Drug, Timing, ODX)

model1<-lme(ODX~Drug+Timing+Drug*Timing, random= ~ 1+Timing|Subjects, data=cancerdata)
anova(model1)
```

```
##             numDF denDF   F-value p-value
## (Intercept)     1    16 125.72414  <.0001
## Drug            1     8  20.13949  0.0020
## Timing          2    16  31.34159  <.0001
## Drug:Timing     2    16   9.01366  0.0024
```

```r
c1<-cancerdata%>%
  filter(Timing=="RightAfter")
t.test(ODX~Drug, data=c1)
```

```
##
##  Welch Two Sample t-test
##
## data:  ODX by Drug
## t = -1.7616, df = 5.9381, p-value = 0.1291
## alternative hypothesis: true difference in means between group A and group B is not equal to 0
## 95 percent confidence interval:
##  -16.26912   2.66912
## sample estimates:
## mean in group A mean in group B
##            22.4            29.2
```

```r
c2<-cancerdata%>%
  filter(Timing=="OneYear")
t.test(ODX~Drug, data=c2)
```

```
##
##  Welch Two Sample t-test
##
## data:  ODX by Drug
## t = -3.1176, df = 6.497, p-value = 0.01861
## alternative hypothesis: true difference in means between group A and group B is not equal to 0
## 95 percent confidence interval:
##  -18.76763  -2.43237
## sample estimates:
## mean in group A mean in group B
##            15.0            25.6
```

```r
c3<-cancerdata%>%
  filter(Timing=="FiveYear")
t.test(ODX~Drug, data=c3)
```

```
##
##  Welch Two Sample t-test
##
## data:  ODX by Drug
## t = -4.0039, df = 5.3958, p-value = 0.008807
## alternative hypothesis: true difference in means between group A and group B is not equal to 0
## 95 percent confidence interval:
##  -20.839777  -4.760223
## sample estimates:
## mean in group A mean in group B
##            12.6            25.4
```

```
#Question 2
library(tidyverse)
library(ggplot2)
library(nlme)
Individual<-c(1:5, 1:5, 6:10, 6:10)
Dosage<-rep(c("Low","High"), each=5)
Drug2<-rep(c("A","B"), each=10)
painscore<-c(52,61,59,37,49,50,58,51,34,41,43,32,21,29,26,33,30,20,21,22)
paindf<-data.frame(Individual,Dosage, Drug2, painscore)

model2<-lme(painscore~Dosage+Drug2+Dosage*Drug2, random= ~ 1+Dosage|Individual, data=paindf)
anova(model2)
```

```
##              numDF denDF   F-value p-value
## (Intercept)      1     8 199.59602  <.0001
## Dosage           1     8  20.26169  0.0020
## Drug2            1     8  19.40837  0.0023
## Dosage:Drug2     1     8   0.00844  0.9291
```

```
#Question 3
library(tidyverse)
library(nlme)
templevel<-rep(c("Med","High"), each = 8)
cookingT<-rep(c("Short","Long"), each = 4)
taste<-c(62,59,41,33,32,31,45,67,82,96,95,90,89,76,88,82)
mytaste<-data.frame(templevel, cookingT, taste)
model3<-aov(taste~templevel+cookingT+templevel*cookingT, data=mytaste)
summary(model3)
```

```
##                    Df Sum Sq Mean Sq F value   Pr(>F)
## templevel           1   6724    6724  48.520 1.51e-05 ***
## cookingT            1    144     144   1.039    0.328
## templevel:cookingT  1      4       4   0.029    0.868
## Residuals          12   1663     139
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
#Question 4
library(tidyverse)
library(nlme)
```

```r
students<-1:8
pedagogy<-rep(c("A","B"), each=16)
monthlabel<-rep(c("m1","m2"), each=8)
performance<-c(67,71,72,79,77,65,63,62,66,73,75,77,75,72,60,61,82,83,88,89,91,90,95,97,88,86,84,82,90,8
mystu<-data.frame(students, pedagogy, monthlabel, performance)
modelstu<-lme(performance~pedagogy+monthlabel+pedagogy*monthlabel, random = ~1|students, data= mystu)
anova(modelstu)
```

```
##                      numDF denDF  F-value p-value
## (Intercept)              1    21 6491.785  <.0001
## pedagogy                 1    21   91.278  <.0001
## monthlabel               1    21    0.146  0.7062
## pedagogy:monthlabel      1    21    0.329  0.5726
```

```r
#Question 5
# kruskal.test(Productivity~Music, data=EmployeeMusic)
```