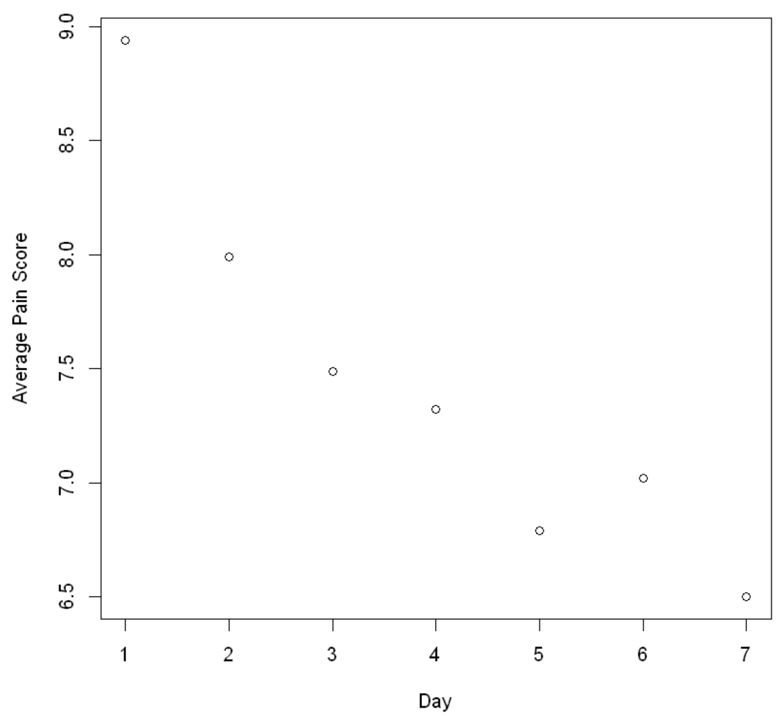
Homework 1

Yue Peng

a.

Day	Pain Score
1	8.94
2	7.99
3	7.49
4	7.32
5	6.79
6	7.02
7	6.50



According to the graph above, the average pain score decreases over time.

b.

```
Call:
lm(formula = Big$pain.1 ~ Big$age)

Residuals:
    Min      1Q  Median      3Q     Max 
-8.1071 -2.1278  0.1408  2.0168 11.3887 

Coefficients:
            Estimate Std. Error t value Pr(>|t|)    
(Intercept) 10.18148    1.54445   6.592 3.66e-10 ***
Big$age     -0.02066    0.02535  -0.815    0.416    
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 3.406 on 203 degrees of freedom
  (1 observation deleted due to missingness)
Multiple R-squared:  0.003261,	Adjusted R-squared:  -0.001649 
F-statistic: 0.6642 on 1 and 203 DF,  p-value: 0.416


Call:
lm(formula = Big$pain.2 ~ Big$age)

Residuals:
    Min      1Q  Median      3Q     Max 
-7.9802 -2.0812 -0.2833  2.2364 12.4529 

Coefficients:
            Estimate Std. Error t value Pr(>|t|)    
(Intercept)  9.74120    1.85034   5.265 4.59e-07 ***
Big$age     -0.02887    0.03012  -0.959    0.339    
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 3.603 on 156 degrees of freedom
  (48 observations deleted due to missingness)
Multiple R-squared:  0.005856,	Adjusted R-squared:  -0.000517 
F-statistic: 0.9189 on 1 and 156 DF,  p-value: 0.3393
```

```
Call:
lm(formula = Big$pain.3 ~ Big$age)

Residuals:
    Min      1Q  Median      3Q     Max 
-7.6946 -2.4095 -0.1244  2.5646 11.2708 

Coefficients:
            Estimate Std. Error t value Pr(>|t|)    
(Intercept)  9.56076    2.04640   4.672 6.46e-06 ***
Big$age     -0.03456    0.03378  -1.023    0.308    
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 3.805 on 154 degrees of freedom
  (50 observations deleted due to missingness)
Multiple R-squared:  0.006751,	Adjusted R-squared:  0.0003016 
F-statistic: 1.047 on 1 and 154 DF,  p-value: 0.3079


Call:
lm(formula = Big$pain.4 ~ Big$age)

Residuals:
    Min      1Q  Median      3Q     Max 
-7.7484 -2.4767 -0.0517  2.7741 11.4746 

Coefficients:
            Estimate Std. Error t value Pr(>|t|)    
(Intercept)  9.00243    1.93074   4.663 6.44e-06 ***
Big$age     -0.02787    0.03156  -0.883    0.379    
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 3.797 on 164 degrees of freedom
  (40 observations deleted due to missingness)
Multiple R-squared:  0.004731,	Adjusted R-squared:  -0.001338 
F-statistic: 0.7795 on 1 and 164 DF,  p-value: 0.3786


Call:
```

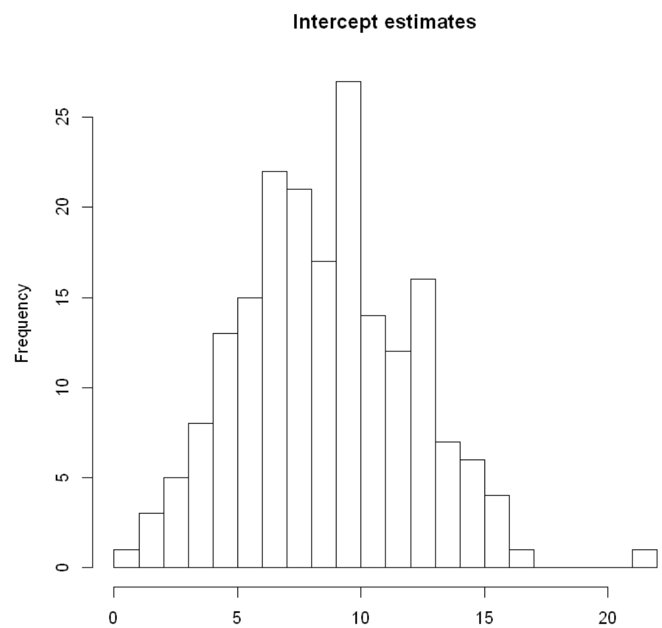
```
lm(formula = Big$pain.5 ~ Big$age)

Residuals:
   Min     1Q Median     3Q    Max 
-7.109 -2.850 -0.321  2.727 10.948 

Coefficients:
            Estimate Std. Error t value Pr(>|t|)    
(Intercept) 10.22071    1.94014   5.268 4.58e-07 ***
Big$age     -0.05762    0.03220  -1.790   0.0755 .  
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 3.674 on 154 degrees of freedom
  (50 observations deleted due to missingness)
Multiple R-squared:  0.02038, Adjusted R-squared:  0.01402 
F-statistic: 3.203 on 1 and 154 DF,  p-value: 0.07546


Call:
lm(formula = Big$pain.6 ~ Big$age)

Residuals:
    Min      1Q  Median      3Q     Max 
-6.3490 -3.1335 -0.2341  2.6366 10.7659 

Coefficients:
            Estimate Std. Error t value Pr(>|t|)    
(Intercept)  8.75729    1.96991   4.446 1.68e-05 ***
Big$age     -0.02874    0.03226  -0.891    0.374    
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 3.854 on 153 degrees of freedom
  (51 observations deleted due to missingness)
Multiple R-squared:  0.00516, Adjusted R-squared:  -0.001342 
F-statistic: 0.7936 on 1 and 153 DF,  p-value: 0.3744


Call:
lm(formula = Big$pain.7 ~ Big$age)
```

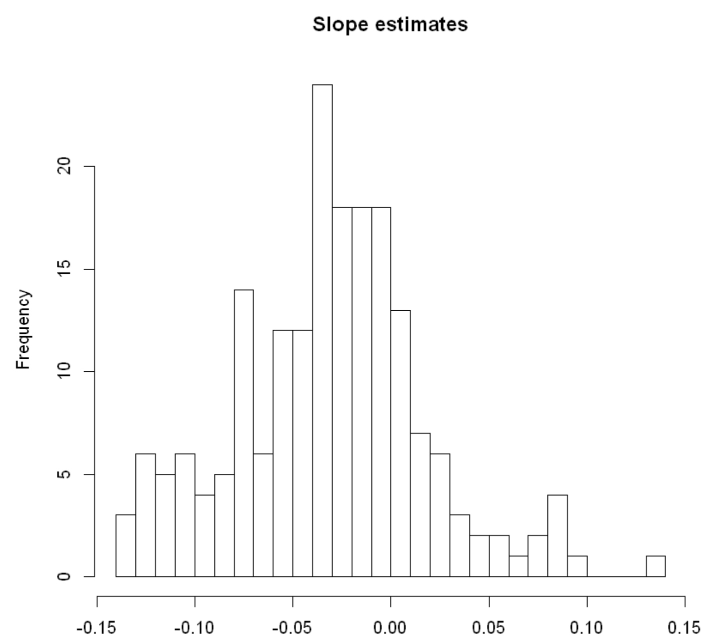
```
Residuals:
    Min      1Q  Median      3Q     Max 
-6.8762 -3.2389 -0.4889  2.9153 11.1791 

Coefficients:
            Estimate Std. Error t value Pr(>|t|)    
(Intercept)  9.86413    2.23231   4.419 1.96e-05 ***
Big$age     -0.05533    0.03630  -1.524     0.13    
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 4.015 on 142 degrees of freedom
  (62 observations deleted due to missingness)
Multiple R-squared:  0.0161,	Adjusted R-squared:  0.009169 
F-statistic: 2.323 on 1 and 142 DF,  p-value: 0.1297
```

	estimate	standard errors	p-values	95% confidence intervals
pain.1	-0.021	0.025	0.416	(-0.071, 0.029)
pain.2	-0.029	0.030	0.339	(-0.088, 0.031)
pain.3	-0.035	0.034	0.308	(-0.101, 0.032)
pain.4	-0.028	0.032	0.379	(-0.09, 0.034)
pain.5	-0.058	0.032	0.075	(-0.121, 0.006)
pain.6	-0.029	0.032	0.374	(-0.092, 0.035)
pain.7	-0.055	0.036	0.130	(-0.127, 0.016)

From the table above, it tells us that the pain is negatively correlated with age on each day, but they are not statistically significant because the p-values are all greater than 0.05.

c.





The slopes range mainly from (-0.05, 0.01) which are quite small, indicating that pain scores change very little by day. More people have less pain by time than people have more pain by time, which also support the situation that trend is decreasing.

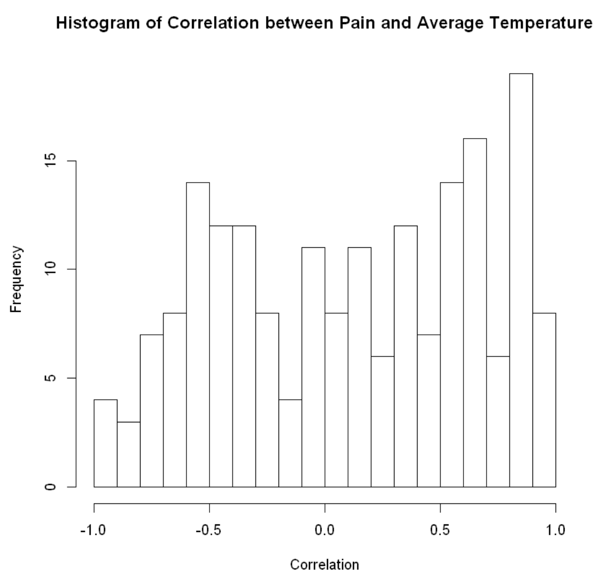
d.

Occupation has too many categories, which is not suitable to fit in a regression model. Thus, I decided not to use this variable in analysis progress.

	P-values of intercepts	P-values of slopes	Related to intercept	Related to slope
Age	0.805	0.772	Not related	Not related
Race	0.762	0.523	Not related	Not related
Income	0.290	0.925	Not related	Not related
Treatment	0.484	0.383	Not related	Not related
Sex	0.210	0.824	Not related	Not related
Working Status	0.232	0.472	Not related	Not related
Use of NSAIDs	0.373	0.029	Not related	Related

Conclusion: use of NSAIDs is correlated with the slope.

e.



The frequency of positive correlations is higher than negative correlations. And the frequency from -0.5 to 0.5 is quite symmetric. It is not clear here but I think there may be correlations between them because a large amount of individuals showed that there are correlations.

2.

Table 2

Varibale	Tai chi	Control	Tai chi vs Control	P-value
WOMAC-Pain, 0-500 mm Week 12	-157.25 (-198.51 to -115.99)	-38.45 (-87.18 to 10.28)	-118.8 (-180.77 to - 56.83)	0.00074
Week 24	-131.55 (-179.63 to -83.47)	-64.6 (-116.08 to - 13.12)	-66.95 (-129.89 to - 4.01)	0.038
Week 48	-115.35 (-172.19 to -58.51)	-69.2 (-126.53 to - 11.87)	-46.15 (-126.44 to 34.14)	0.24
WOMAC-Physical Function, 0-1700 mm, Week 12	-506.75 (-635.52 to -377.98)	-182.15 (-321.8 to - 42.5)	-324.6 (-490.76 to - 158.44)	0.00063
Week 24	-440.5 (-582.58 to -298.42)	-257.3 (-408.63 to - 105.97)	-183.2 (-363.18 to - 3.22)	0.046
Week 48	-405.85 (-577.68 to -234.02)	-300.55 (-452.98 to - 148.12)	-105.3 (-296.03 to 85.43)	0.26
WOMAC-Stiffness, 0-200 mm Week 12	-73.05 (-90.49 to -55.61)	-50.15 (-75.84 to - 24.46)	-22.9 (-48.18 to 2.38)	0.073
Week 24	-65 (-87.16 to -42.84)	-50.2 (-72.99 to -27.41)	-14.8 (-43.12 to 13.52)	0.29
Week 48	-64.15 (-86.18 to -42.12)	-60.5 (-88.89 to -32.11)	-3.65 (-40.03 to 32.73)	0.84
Physician, 0-10 cm VAS Week 12	-3.15 (-3.88 to -2.41)	-1.44 (-2.1 to -0.78)	-1.71 (-2.73 to -0.68)	0.0025
Week 24	-2.6 (-3.37 to -1.82)	-2.06 (-2.95 to -1.17)	-0.53 (-1.65 to 0.58)	0.33
Week 48	-2.54 (-3.62 to -1.45)	-1.54 (-2.25 to -0.83)	-0.98 (-2.19 to 0.22)	0.1
Patient Global, 0-10 cm VAS Week 12	-2.98 (-3.94 to -2.02)	-0.83 (-1.86 to 0.21)	-2.15 (-3.47 to -0.83)	0.0029
Week 24	-2.36 (-3.63 to -1.09)	-1.71 (-2.98 to -0.44)	-0.65 (-2.23 to 0.93)	0.4
Week 48	-1.65 (-3.4 to 0.09)	-1.7 (-3.15 to -0.24)	0.04 (-2.17 to 2.25)	0.97
6 Minute Walk Test(yards) Week 12	40.28 (9.3 to 71.27)	-1.42 (-42.17 to 39.33)	41.12 (-18.33 to 100.57)	0.16
Week 24	44.28 (8.36 to 80.19)	7.84 (-27.9 to 43.58)	36 (-22.87 to 94.87)	0.22
Week 48	28.75 (-12.45 to 69.94)	17.14 (-17.27 to 51.55)	4.73 (-56.23 to 65.68)	0.87

Varibale	Tai chi	Control	Tai chi vs Control	P-value
Balance Score, 0-5 Week 12	0.15 (-0.08 to 0.38)	0.25 (-0.05 to 0.55)	-0.1 (-0.53 to 0.33)	0.63
Week 24	0.15 (-0.16 to 0.46)	0.07 (-0.37 to 0.52)	0.07 (-0.52 to 0.67)	0.8
Week 48	0.35 (0.04 to 0.66)	0.47 (0.07 to 0.88)	-0.16 (-0.72 to 0.4)	0.56
Chair Stand Time(seconds) Week 12	-12.03 (-16.68 to -7.39)	-0.94 (-4.84 to 2.97)	-11.1 (-16.64 to -5.56)	0.00053
Week 24	-9.88 (-14.08 to -5.67)	-4.81 (-9.28 to -0.33)	-5.07 (-10.9 to 0.77)	0.085
Week 48	-9.23 (-14.62 to -3.83)	-3.8 (-8.01 to 0.41)	-4 (-9.49 to 1.48)	0.14
SF-36 Mental Component Summary, 0-100 Week 12	2.14 (-4.02 to 8.31)	1.93 (-2.62 to 6.49)	0.21 (-7.12 to 7.54)	0.95
Week 24	4.39 (-2.06 to 10.84)	4.5 (0.87 to 8.13)	-0.11 (-7.57 to 7.35)	0.98
Week 48	5.8 (-0.46 to 12.07)	1.04 (-5.07 to 7.14)	4.77 (-5.03 to 14.57)	0.32
SF-36 Physical Component Summary, 0-100 Week 12	11.57 (7.61 to 15.53)	4.14 (0.68 to 7.6)	7.43 (1.75 to 13.11)	0.013
Week 24	10.8 (6.69 to 14.91)	6.29 (1.98 to 10.59)	4.51 (-2.35 to 11.37)	0.18
Week 48	10.41 (5.64 to 15.18)	4.1 (0 to 8.2)	6.32 (-0.45 to 13.08)	0.065
CES-D, 0-60 Week 12	-7.4 (-11.38 to -3.42)	-0.7 (-3.88 to 2.48)	-6.7 (-12 to -1.4)	0.016
Week 24	-6.4 (-11.39 to -1.41)	-1.1 (-5.04 to 2.84)	-5.3 (-11.52 to 0.92)	0.091
Week 48	-7.25 (-11.77 to -2.73)	1.65 (-2.39 to 5.69)	-8.9 (-14.92 to -2.88)	0.0059
Self-Efficacy Score, 1-5 Week 12	0.6 (-0.01 to 1.21)	-0.11 (-0.53 to 0.31)	0.71 (-0.06 to 1.48)	0.07
Week 24	0.68 (0.13 to 1.23)	-0.17 (-0.69 to 0.35)	0.85 (0.08 to 1.62)	0.032
Week 48	0.72 (0 to 1.44)	-0.24 (-0.65 to 0.17)	0.96 (0.18 to 1.74)	0.018

Appendix (R code)

```
# Homework 1 for PHP2550
MC_Big <- read.csv("mcalindon_Big.csv")
dim(MC_Big)
# Extract the first observation for each individual
num <- rle(MC_Big$ID)
index <- c(cumsum(num$lengths) + 1)
index <- c(1, index)
Big <- MC_Big[index, ]
dim(Big)
# a
ave_pain <- round(colMeans(data.frame(Big$pain.1, Big$pain.2, Big$pain.3, B
ig$pain.4,
    Big$pain.5, Big$pain.6, Big$pain.7), na.rm = TRUE),2)
df_a <- data.frame(Day=c(1:7), Pain=ave_pain)
colnames(df_a) <- c("Day", "Pain Score")
rownames(df_a) <- c(1:7)
plot(seq(7), ave_pain, xlab = "Day", ylab = "Average Pain Score")
model1 <- lm(Big$pain.1~Big$age)
print(summary(model1))
model2 <- lm(Big$pain.2~Big$age)
print(summary(model2))
model3 <- lm(Big$pain.3~Big$age)
print(summary(model3))
model4 <- lm(Big$pain.4~Big$age)
print(summary(model4))
model5 <- lm(Big$pain.5~Big$age)
print(summary(model5))
model6 <- lm(Big$pain.6~Big$age)
print(summary(model6))
model7 <- lm(Big$pain.7~Big$age)
print(summary(model7))
res_confint <- c()
get_confint <- function(x){
   int_left <- confint(x, level=0.95)[2, 1]
   int_right <- confint(x, level=0.95)[2, 2]
   res_confint <- c(int_left, int_right)
   return(res_confint)
```

```
}
model = list(model1, model2, model3, model4, model5, model6, model7)
for (i in model){
  res_confint <- c(res_confint,get_confint(i))

}
res_estimate <- c()
get_estimate <- function(x){
   res <- summary(x)[[4]][2,1]
}
for (i in model){
  res_estimate <- c(res_estimate,get_estimate(i))

}
res_sd <- c()
get_sd <- function(x){
   res <- summary(x)[[4]][2,2]
}
for (i in model){
  res_sd <- c(res_sd,get_sd(i))

}
res_pvalue <- c()
get_pvalue <- function(x){
   res <- summary(x)[[4]][2,4]
}
for (i in model){
  res_pvalue <- c(res_pvalue,get_pvalue(i))

}
# reshape and organize
res_conf <- c()
i = 1
while (i <= 13){
   res_conf <- c(res_conf, paste0("(",round(res_confint[i], digits = 3),",
 ", round(res_confint[i+1], digits = 3), ")"))
   i = i + 2
}
rm(res_confint)

res_estimate <- round(res_estimate, digits = 3)
```

```r
res_sd <- round(res_sd, digits = 3)

res_pvalue <- round(res_pvalue, digits = 3)
# make it a table
df_b <- data.frame(estimate=res_estimate, standard_errors=res_sd, p_values
=res_pvalue, CI=res_conf)
rownames(df_b) <- c("pain.1","pain.2","pain.3","pain.4","pain.5","pain.6",
"pain.7")
colnames(df_b) <- c("estimate", "standard errors", "p-values", "95% confide
nce intervals")
sub_Big_time <- data.frame(Big$pain.1, Big$pain.2, Big$pain.3, Big$pain.4,
Big$pain.5, Big$pain.6, Big$pain.7)
# get rid of >= 5 NA and keep at least three point
clean_na <- function(x){
    if (sum(is.na(x)) >= 5){
        return(1)
    }else{
        return(0)
    }
}
idx1 <- c()
for (i in 1:(dim(sub_Big_time)[1])){
    if (clean_na(sub_Big_time[i,])){
        idx1 <- c(idx1, i)
    }
}
# Extract time
time <- cbind(Big$lastdt1, Big$lastdt2, Big$lastdt3, Big$lastdt4, Big$lastd
t5, Big$lastdt6, Big$lastdt7)[-idx1,]
for (i in (1:dim(time)[1])){
    time[i,] <- time[i,] - rep(time[i,1],7)
}
# make table
df_c1 <- c()
for (i in 1:(dim(sub_Big_time[-idx1,])[1])){
    df_c1<- c(df_c1, summary(lm(as.numeric(sub_Big_time[-idx1,][i,])~time
[i,], na.action=na.omit))[[4]][,1])
}
tmp <- df_c1
```

```
x1 <- tmp[1]
x2 <- tmp[2]
i = 3
while (i <= 386){
   x1 <- c(x1, tmp[i])
   x2 <- c(x2, tmp[i+1])
   i = i + 2
}
rm(tmp)
x1 <- round(x1, digits = 2)
x2 <- round(x2, digits = 2)
df_c <- data.frame(slopes=x2,intercepts=x1)
rownames(df_c) <- as.character(Big$ID[-idx1])
hist(df_c$intercepts, breaks = 20, xlab = "", main = "Intercept estimates")
hist(df_c$slopes, breaks = 20, xlab = "", main = "Slope estimates")
# Race
p_race1 <- cor.test(df_c$intercepts, Big$racecat[-idx1])[[3]]
p_race2 <- cor.test(df_c$slopes, Big$racecat[-idx1])[[3]]
# Age
p_age1 <- cor.test(df_c$intercepts, Big$agecat[-idx1])[[3]]
p_age2 <- cor.test(df_c$slopes, Big$agecat[-idx1])[[3]]
# income
p_income1 <- cor.test(df_c$intercepts, Big$inccat[-idx1])[[3]]
p_income2 <- cor.test(df_c$slopes, Big$inccat[-idx1])[[3]]
# treatment
p_trt1 <- cor.test(df_c$intercepts, Big$treat[-idx1])[[3]]
p_trt2 <- cor.test(df_c$slopes, Big$treat[-idx1])[[3]]
# sex
p_sex1 <- cor.test(df_c$intercepts, Big$sex[-idx1])[[3]]
p_sex2 <- cor.test(df_c$slopes, Big$sex[-idx1])[[3]]
# retire
p_retire1 <- cor.test(df_c$intercepts, Big$retire[-idx1])[[3]]
p_retire2 <- cor.test(df_c$slopes, Big$retire[-idx1])[[3]]
# NSAIDs
p_nsaids1 <- cor.test(df_c$intercepts, Big$nsaid[-idx1])[[3]]
p_nsaids2 <- cor.test(df_c$slopes, Big$nsaid[-idx1])[[3]]
df_d <- data.frame(intercepts=round(c(p_age1, p_race1, p_income1, p_trt1, p
_sex1, p_retire1, p_nsaids1), digits = 3),
                   slopes=round(c(p_age2, p_race2, p_income2, p_trt2, p_sex
2, p_retire2, p_nsaids2), digits = 3),
                 related1=c(NA),related2=c(NA))
```

```r
rownames(df_d) <- c("Age", "Race", "Income", "Treatment", "Sex", "Working S
tatus", "Use of NSAIDs")
related <- function(x){
    if (x > 0.05){
        return("Not related")
    }else{
        return("Related")
    }
}
related1 <- c()
for (i in 1:7){
    related1 <- c(related1, related(df_d$intercepts[i]))
}
related2 <- c()
for (i in 1:7){
    related2 <- c(related2, related(df_d$slopes[i]))
}
df_d$related1 <- related1
df_d$related2 <- related2
colnames(df_d) <- c("P-values of intercepts", "P-values of slopes", "Relate
d to intercept", "Related to slope")
# Extract WeatherDate and corresponding avetemp
WT <- data.frame(ID=MC_Big$ID, WeatherDate=MC_Big$WeatherDate, avgtemp=MC_
Big$avgtemp)
find_temp <- function(x, y){
    if (is.na(y)){
        return(NA)
    }else{
    return(WT$avgtemp[which(WT$ID==x & WT$WeatherDate==y)])
        }
}
# add avetemp for each day into used data
Big$temp1 <- mapply(find_temp, Big$ID, Big$lastdt1)
Big$temp2 <- mapply(find_temp, Big$ID, Big$lastdt2)
Big$temp3 <- mapply(find_temp, Big$ID, Big$lastdt3)
Big$temp4 <- mapply(find_temp, Big$ID, Big$lastdt4)
Big$temp5 <- mapply(find_temp, Big$ID, Big$lastdt5)
Big$temp6 <- mapply(find_temp, Big$ID, Big$lastdt6)
Big$temp7 <- mapply(find_temp, Big$ID, Big$lastdt7)
cor_e <- c()
for (i in c(1:206)[-idx1]){
```

```
    cor_e <- c(cor_e, cor(c(Big$pain.1[i], Big$pain.2[i], Big$pain.3[i], Big$pain.4[i], Big$pain.5[i], Big$pain.6[i],
             Big$pain.7[i]),
           c(Big$temp1[i], Big$temp2[i], Big$temp3[i], Big$temp4[i], Big$temp5[i], Big$temp6[i],
             Big$temp7[i]), use="na.or.complete"))
}
cor_e <- round(cor_e, digits = 3)
hist(cor_e, breaks=20, xlab = "Correlation", main = "Histogram of Correlation between Pain and Average Temperature")
Wang <- read.csv("Wang.csv")
dim(Wang)
find_value <- function(var, group, date){
    if (group == 3){
        return(
        paste0(round(lm((Wang[,paste0(var,date)][Wang$group==1]-Wang[,paste0(var,date)][Wang$group==0])-
                      (Wang[,paste0(var,"1")][Wang$group==1]-Wang[,paste0(var,"1")][Wang$group==0])~1)[[5]][1], digits = 2),
             " (", round(confint(lm((Wang[,paste0(var,date)][Wang$group==1]-Wang[,paste0(var,date)][Wang$group==0])-
                      (Wang[,paste0(var,"1")][Wang$group==1]-Wang[,paste0(var,"1")][Wang$group==0])~1))[1], digits = 2),
             " to ",
              round(confint(lm((Wang[,paste0(var,date)][Wang$group==1]-Wang[,paste0(var,date)][Wang$group==0])-
                      (Wang[,paste0(var,"1")][Wang$group==1]-Wang[,paste0(var,"1")][Wang$group==0])~1))[2], digits = 2),
             ")")
        )
    }else{
    return(
        paste0(round(lm(Wang[,paste0(var,date)][Wang$group==group]-Wang[,paste0(var,"1")][Wang$group==group]~1)[[5]][1], digits = 2),
             " (", round(confint(lm(Wang[,paste0(var,date)][Wang$group==group]-Wang[,paste0(var,"1")][Wang$group==group]~1))[1], digits = 2),
             " to ",
              round(confint(lm(Wang[,paste0(var,date)][Wang$group==group]-Wang[,paste0(var,"1")][Wang$group==group]~1))[2], digits = 2),
             ")")
             )
```

```
      }
}
find_p <- function(var, date){
   return(signif(summary(lm((Wang[,paste0(var,date)][Wang$group==1]-Wang
[,paste0(var,date)][Wang$group==0])-
                  (Wang[,paste0(var,"1")][Wang$group==1]-Wang[,paste0(va
r,"1")][Wang$group==0])~1))$coef[4],digits=2))
}
var <- c("womac.pain.", "womac.phys.func.", "womac.stiff.", "physician.vas.
", "pt.global.vas.", "walkyard.", "balance.",
      "chairstand.", "mcs.", "pcs.", "cesd.", "self.efficacy.")
date <- c("2", "3", "4")
group <- c(1, 0, 3)
values <- function(x, y){
   tmp <- c()
for (i in group){
   tmp <- c(tmp, mapply(find_value, var[x], i, date[y]))
 }
   tmp <- c(tmp, find_p(var[x], date[y]))
   return(tmp)
}
df_2 <- rbind(values(1,1), values(1,2), values(1,3))
for (i in 2:12){
 df_2 <- rbind(df_2, rbind(values(i,1), values(i,2), values(i,3)))
   }
table2 <- data.frame(Variable=c("WOMAC-Pain, 0-500 mm Week 12", "Week 24",
"Week 48", "WOMAC-Physical Function, 0-1700 mm,Week 12",
                           "Week 24", "Week 48",
                           "WOMAC-Stiffness, 0-200 mm Week 12", "Week 24",
"Week 48",
                          "Physician, 0-10 cm VAS Week 12", "Week 24", "Wee
k 48",
                           "Patient Global, 0-10 cm VAS Week 12", "Week 24
", "Week 48",
                           "6 Minute Walk Test(yards) Week 12", "Week 24",
"Week 48",
                          "Balance Score, 0-5 Week 12", "Week 24", "Week 48
",
                           "Chair Stand Time(seconds) Week 12", "Week 24",
"Week 48",
```

```
                                 "SF-36 Mental Component Summary, 0-100 Week 12",
 "Week 24", "Week 48",
                                "SF-36 Physical Component Summary, 0-100 Week 12
", "Week 24", "Week 48",
                                 "CES-D, 0-60 Week 12", "Week 24", "Week 48",
                                 "Self-Efficacy Score, 1-5 Week 12", "Week 24", "
Week 48"),
                    Taichi=df_2[,1], Control=df_2[,2], TvsC=df_2[,3], pvalue=d
f_2[,4])
colnames(table2) <- c("Varibale", "Tai chi", "Control", "Tai chi vs Control
", "P-value")
```