

STA302H1 – Final Project Descriptive Statistics

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Import STA302H1 Study Time and COVID Contemplation Time vs. Quiz Performance Dataset

Data Cleaning

First, I'll clean my data.

```
cleaned_sta302_performance_data <- sta302_performance_data %>%  
  # Create a new "country" column, which is just "Country" but whose entries are factors.  
  mutate(country = as.factor(Country)) %>%  
  
  # TODO: Replace quiz grades, covid hours, and sta302h1 study hours with their  
  # TODO: median counterparts.  
  
  # Remove the "X" column: it's simply the row number, which isn't very useful.  
  # Remove the "Country" column: column "country" already exists  
  dplyr::select(-X, -Country) %>%  
  
  # Rearrange similar columns side-by-side.  
  relocate(country,  
            COVID.hours..W1., COVID.hours..W2., COVID.hours..W3., COVID.hours..W4.,  
            STA302.hours..W1., STA302.hours..W2., STA302.hours..W3., STA302.hours..W4.,  
            Quiz_1_score, Quiz_2_score, Quiz_3_score, Quiz_4_score)
```

Helper Functions

```
num_column_NAs = function(predictor_variable) {  
  sum(is.na(predictor_variable))  
}
```

```
row_nums_of_NA_columns = function(data, predictor_variable) {  
  which(is.na(predictor_variable))  
}
```

```
rows_with_num_NAs = function(data, num_NAs) {  
  return (rowSums(is.na(data)) == num_NAs)  
}
```

```
row_nums_of_NA_rows = function(data, num_NAs) {  
  return (which(rows_with_num_NAs(data, num_NAs)))  
}
```

```
display_histogram <- function(data, predictor_variable, histogram_title, x_axis_label) {  
  ggplot(data = tibble(data), mapping = aes(x = predictor_variable)) +  
    geom_histogram(col = "black", fill = "red", bins = 30) +  
    labs(title = histogram_title, y = "Frequency", x = x_axis_label) +  
    geom_vline(mapping = aes(xintercept = mean(predictor_variable, na.rm = TRUE)),  
              color = "blue", linetype = "solid") +  
    geom_vline(mapping = aes(xintercept = median(predictor_variable, na.rm = TRUE)),  
              color = "dark green", linetype = "dotted")  
}
```

```
display_boxplot <- function(data, predictor_variable, boxplot_title, y_axis_label) {  
  ggplot(mapping = aes(x = Country, y = predictor_variable, color = Country)) +  
    geom_boxplot(mapping = aes(x = Country, y = predictor_variable)) +  
    labs(title = boxplot_title, x = "Country", y = y_axis_label)  
}
```

```
get_row_nums_to_exclude <- function(data) {  
  row_nums_with_3_NAs = which(rows_with_num_NAs(data, 3))  
  row_nums_with_4_NAs = which(rows_with_num_NAs(data, 4))  
  row_nums_to_exclude <- union(row_nums_with_3_NAs,  
                               row_nums_with_4_NAs)  
  return (row_nums_to_exclude)  
}
```

```
display_correlation_by_country <- function(country_data) {  
  colnames(country_data) <- c("W1COV", "W2COV", "W3COV", "W4COV",  
                              "W1302", "W2302", "W3302", "W4302",  
                              "Q1", "Q2", "Q3", "Q4")  
  round(cor(country_data, use = "pairwise.complete.obs", method = "pearson"), 2)  
}
```

Special Tables

Rows With At Least One NA

Rows with at least one NA deserve closer examination.

Some of the rows might only have 1 - 2 NAs and are therefore salvageable, which is OK.

Other rows may contain 3 or more NAs, and might indicate students who have dropped STA302H1. We'd like to exclude them from our analysis.

Here are the number of rows with 0 - 4 NAs.

```
##   nrows_0_NAs nrows_1_NAs nrows_2_NAs nrows_3_NAs nrows_4_NAs
## 1           143           9           16           19           1
```

Columns with NAs

```
##   week1_covid week2_covid week3_covid week4_covid
## 1           26           22           21           40
```

```
##   week1_sta302 week2_sta302 week3_sta302 week4_sta302
## 1           26           22           20           40
```

```
##   quiz1_score quiz2_score quiz3_score quiz4_score
## 1           13           36           31           34
```

Number of Missed Quizzes

```
##   miss_0_quizzes miss_1_quizzes miss_2_quizzes miss_3_quizzes miss_4_quizzes
## 1           176           20           3           24           4
```

Who to Exclude from the Dataset?

Identify rows with at least 3 missing quiz marks. These indicate students who have dropped STA302H1, and who should be excluded from the final data.

Notice that we didn't check the number of NAs for country of origin, COVID hours, and STA302H1 hours, since some students either forgot or abstained. So there's no reason to exclude these students from our final dataset.

```
row_nums_to_exclude <- get_row_nums_to_exclude(quiz_grades)
cleaned_sta302_performance_data2 =
  cleaned_sta302_performance_data[-row_nums_to_exclude,]
```

Rows with Mistyped Columns

Rows whose columns are mis-typed may need to be corrected via imputation.

```
rows_with_mistyped_columns = cleaned_sta302_performance_data2[c(38, 83, 84, 117),]
# row 83: Country -> "canada" -- DONE
# row 84: Country -> "canada" -- DONE

# row 117: COVID.hours..W4. -> 0.5 hours -- DONE

# row 38: STA302.hours..W3. -> 5.5<U+00A0> -- DONE
# row 117: STA302.hours..W4. -> 7.5 hours -- DONE
```

```
# library(janitor)
# use it to clean up data.
```

Rows Without Country Entry

Taking out the country column can come in handy for functions like `cor()` where factors aren't allowed.

```
rows_with_no_country = cleaned_sta302_performance_data2 %>%
  dplyr::select(-country)
```

Rows Filtered by Country

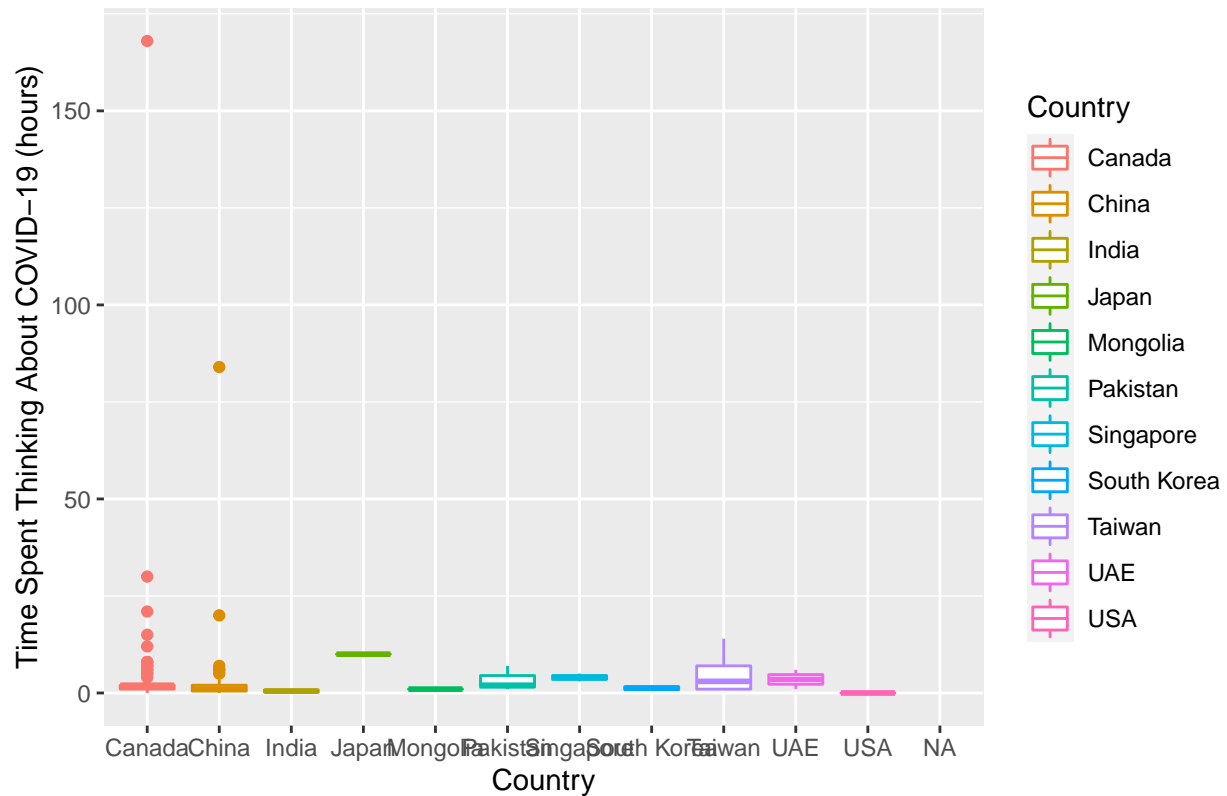
This is useful if we want data for individual countries.
Only the first and last code snippets are shown.

```
canada <- cleaned_sta302_performance_data2 %>%
  filter(as.character(country) == "Canada") %>%
  dplyr::select(-country)

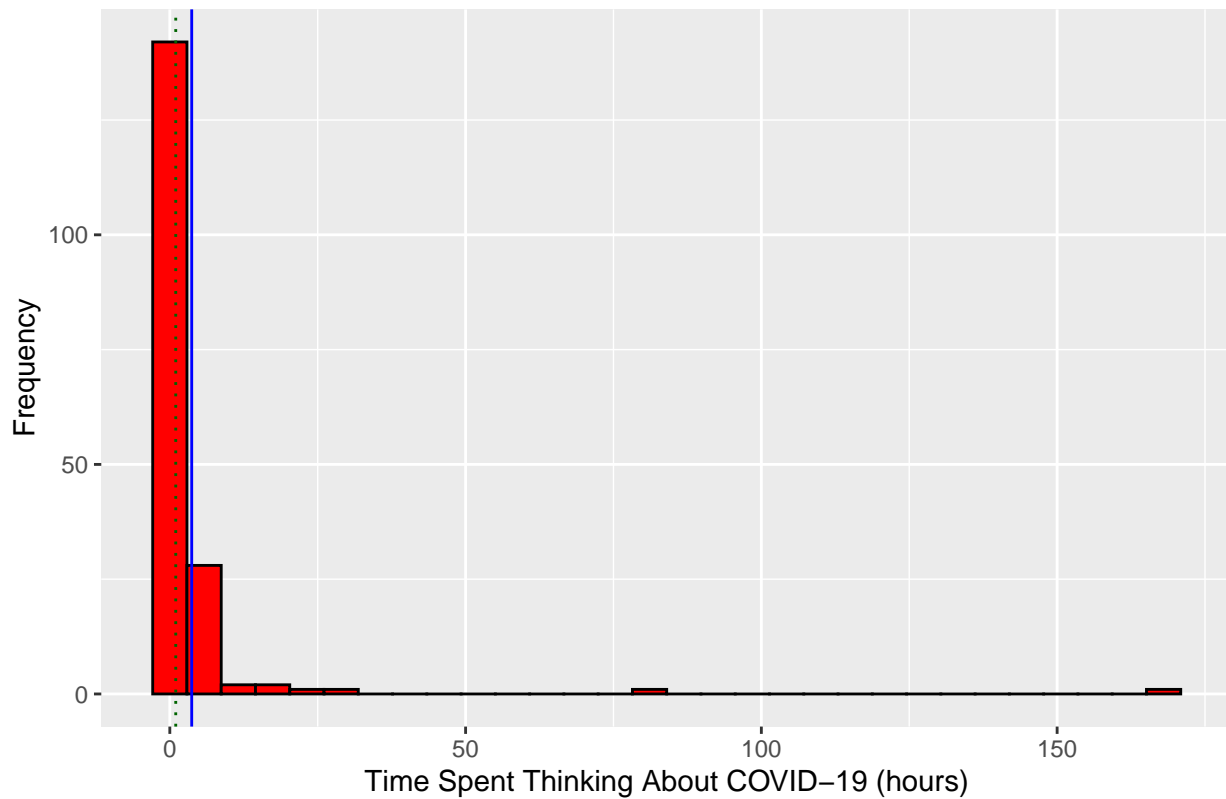
unknown <- cleaned_sta302_performance_data2 %>%
  filter(is.na(as.character(country))) %>%
  dplyr::select(-country)
```

##	Country
## Canada	97
## China	63
## India	2
## Japan	1
## Mongolia	1
## Pakistan	3
## Singapore	2
## South_Korea	2
## Taiwan	3
## UAE	2
## USA	2
## Unknown	21

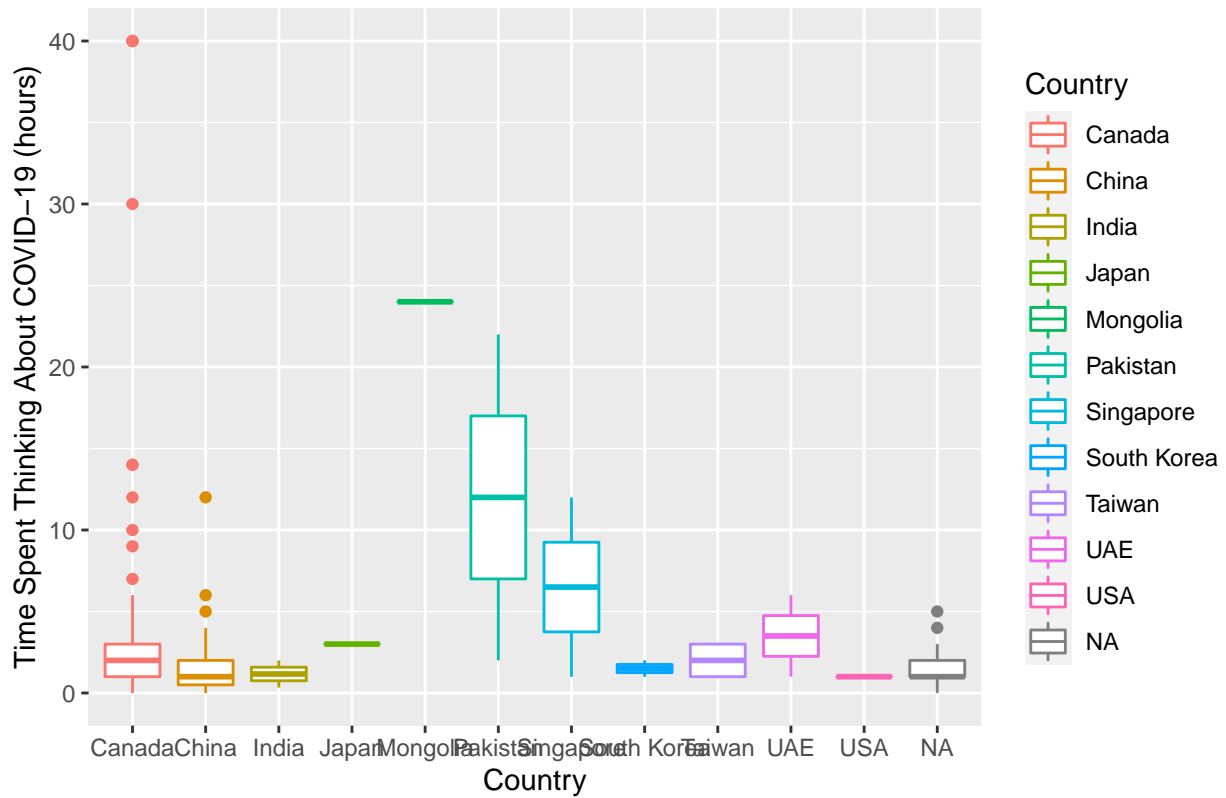
Country vs. Week 1 Time Spent Thinking About COVID-19



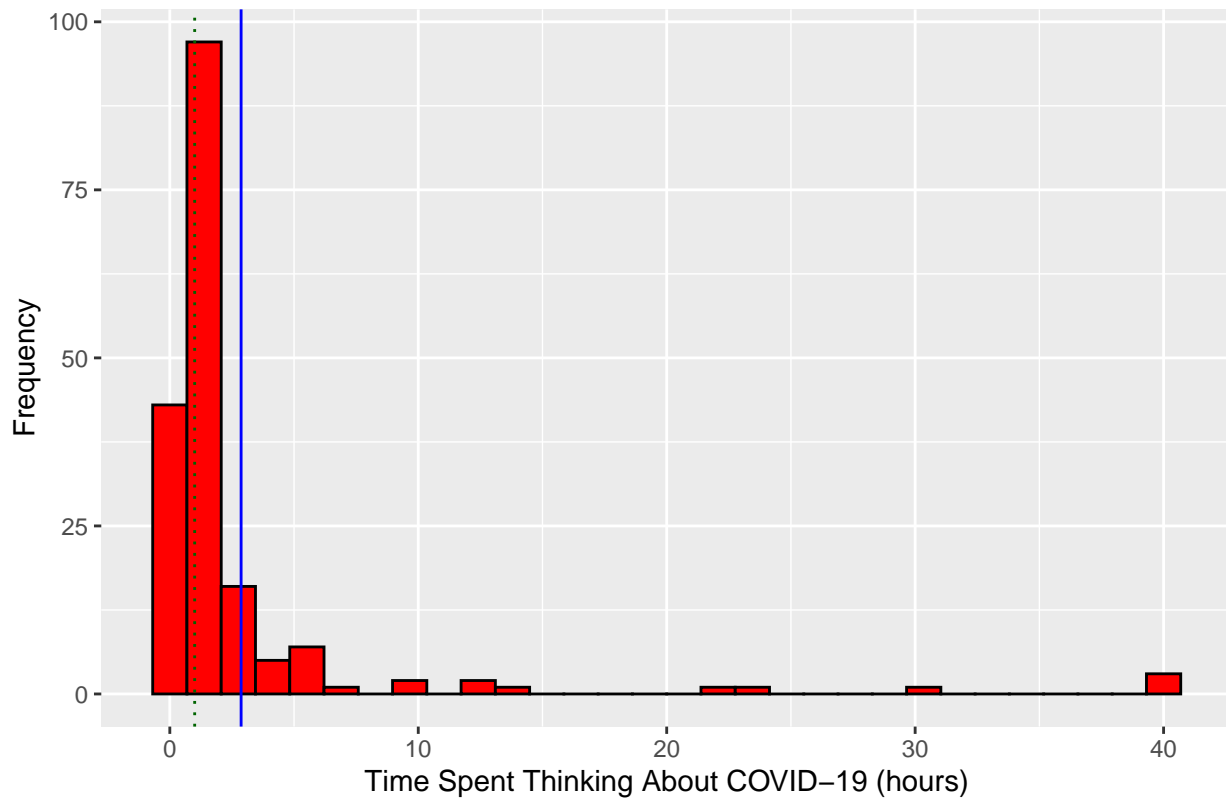
Histogram of Week 1 Time Spent Thinking About COVID-19



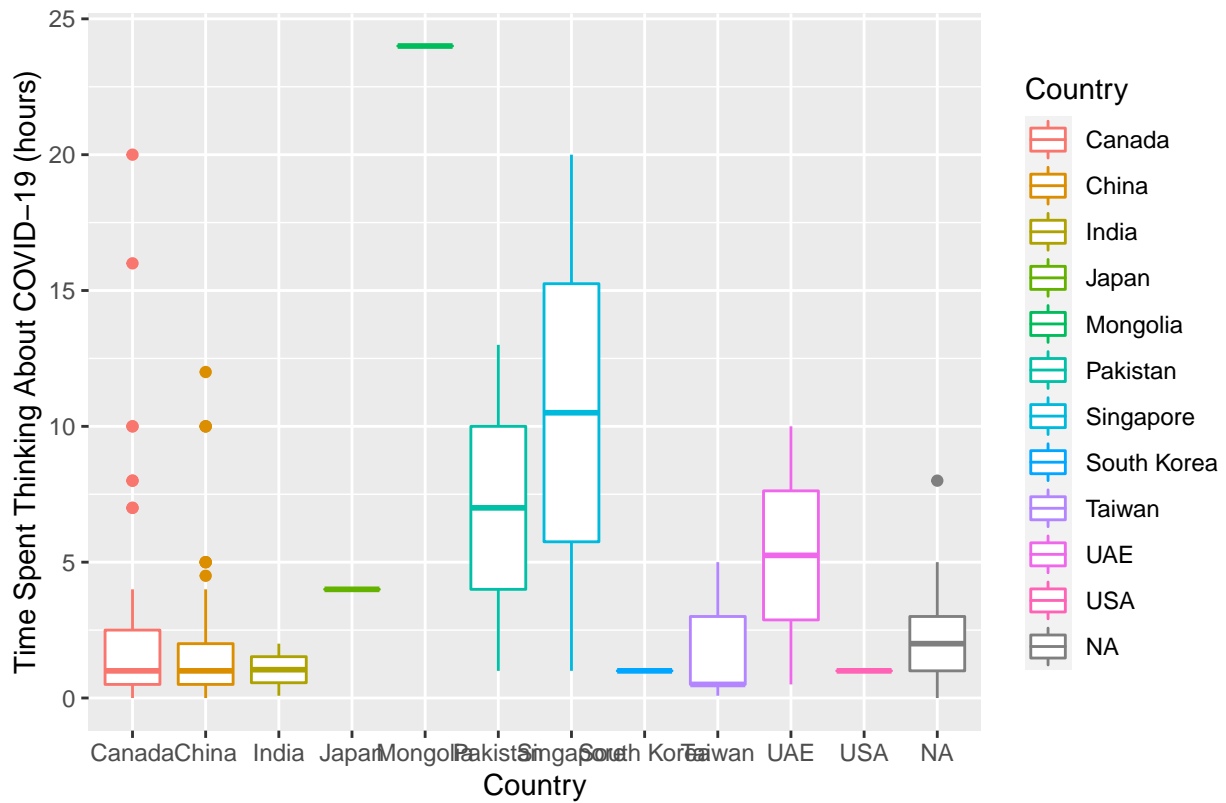
Country vs. Week 2 Time Spent Thinking About COVID-19



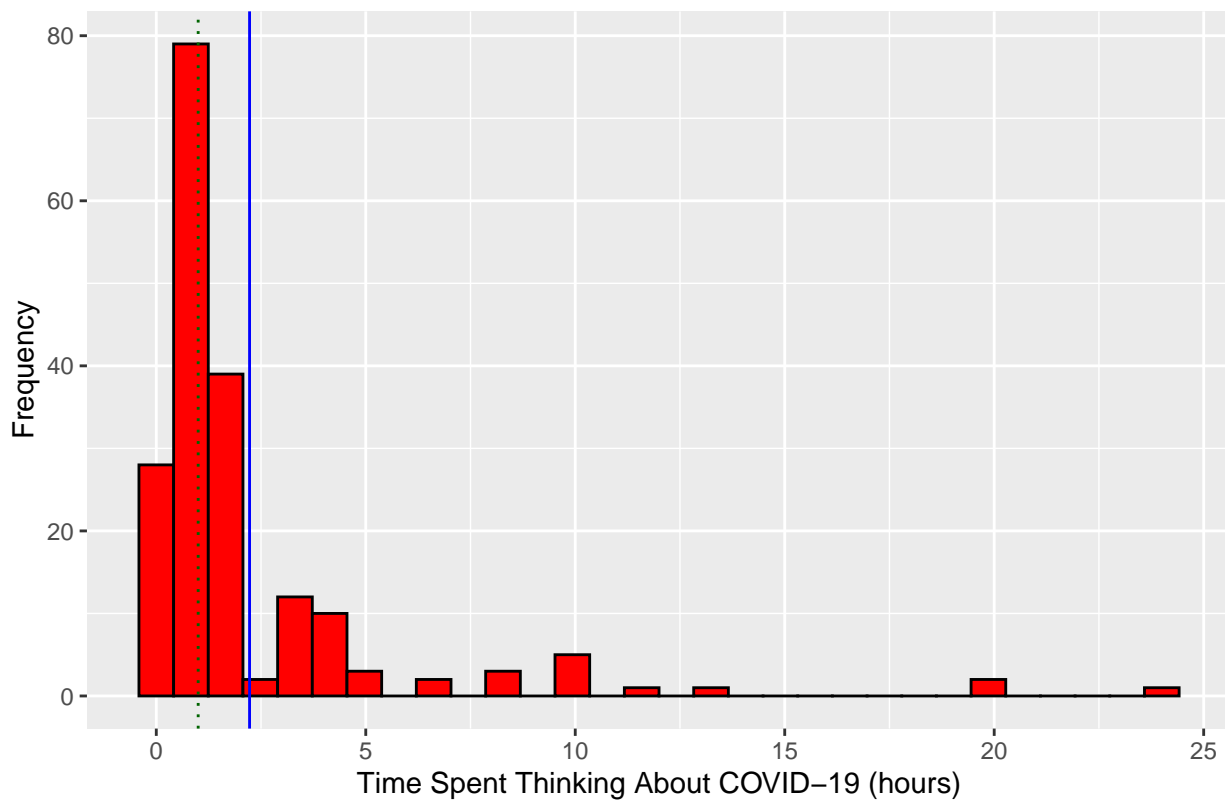
Histogram of Week 2 Time Spent Thinking About COVID-19



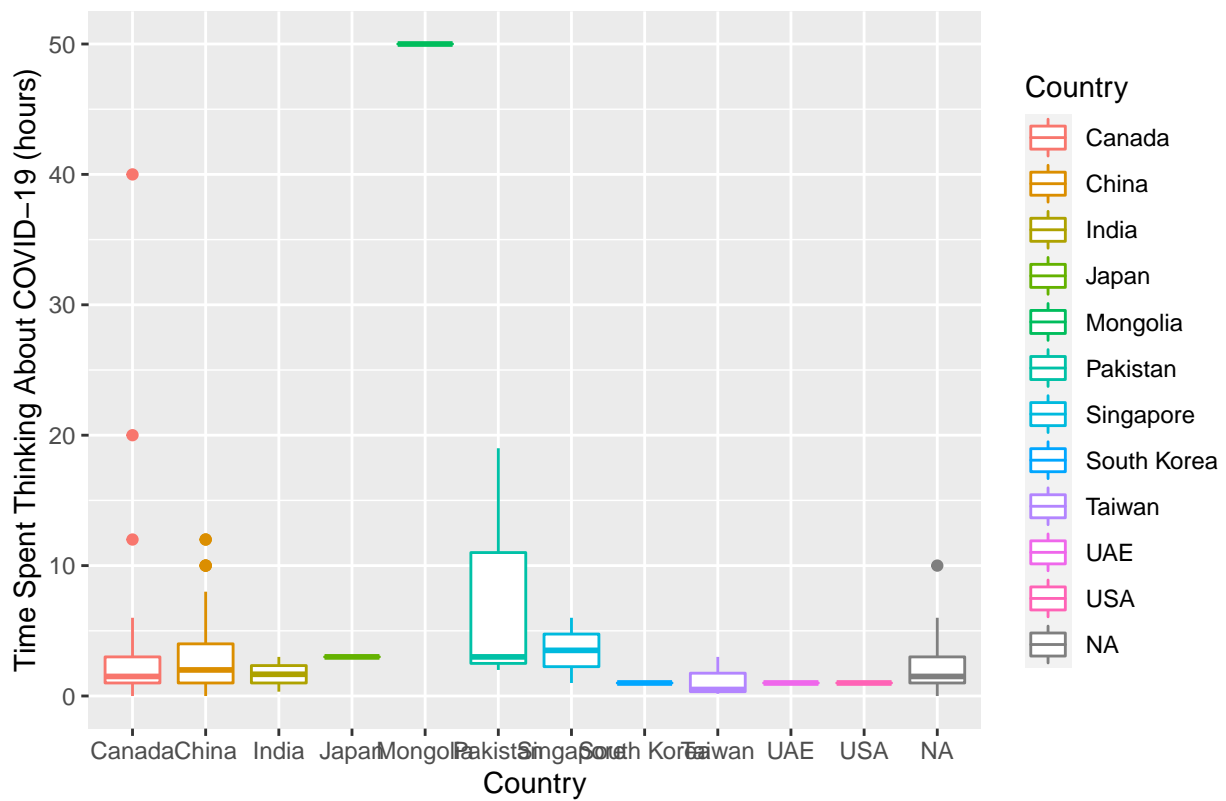
Country vs. Week 3 Time Spent Thinking About COVID-19



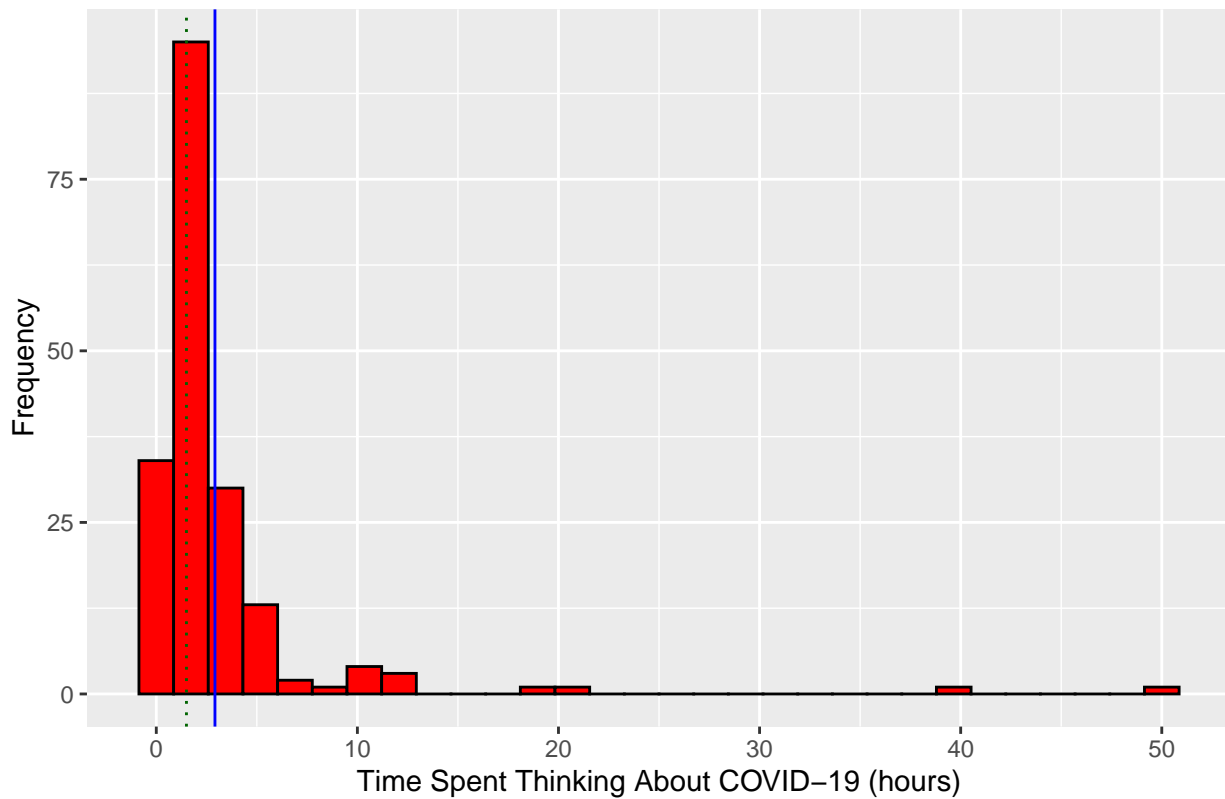
Histogram of Week 3 Time Spent Thinking About COVID-19



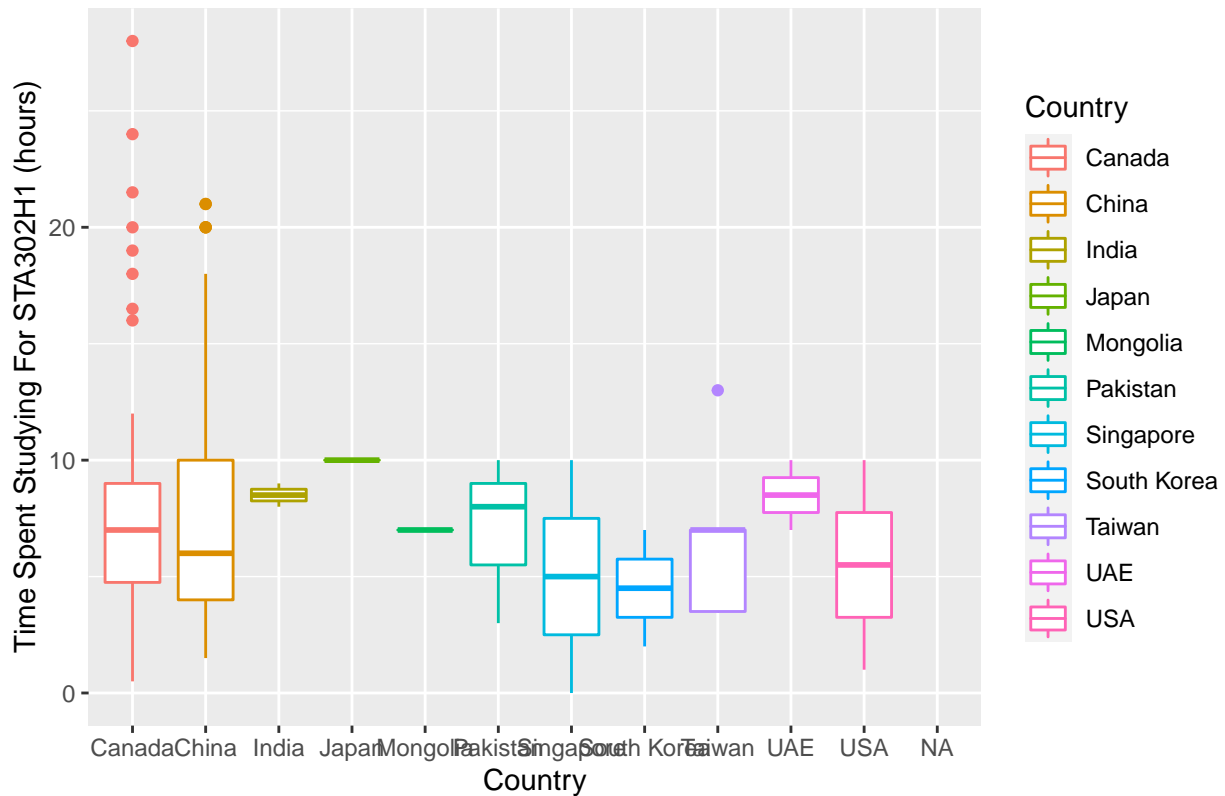
Country vs. Week 4 Time Spent Thinking About COVID-19



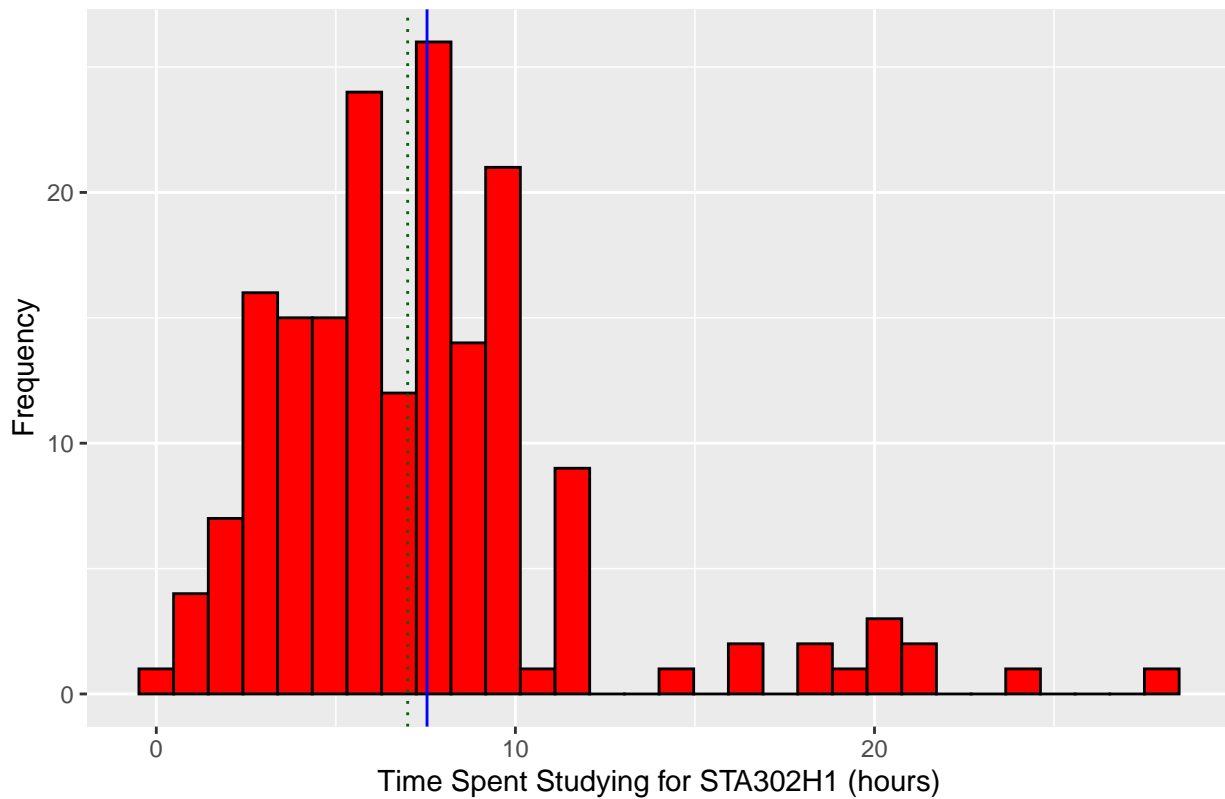
Histogram of Week 4 Time Spent Thinking About COVID-19

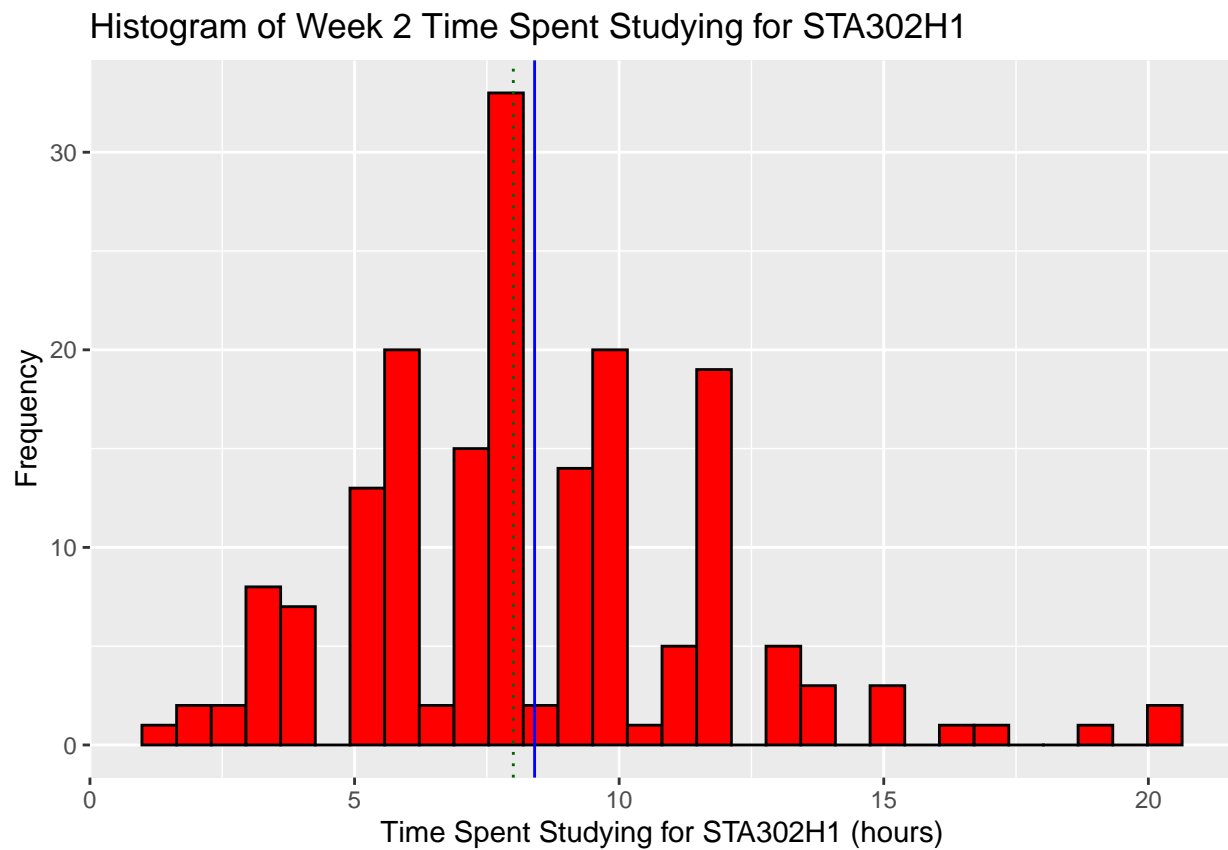
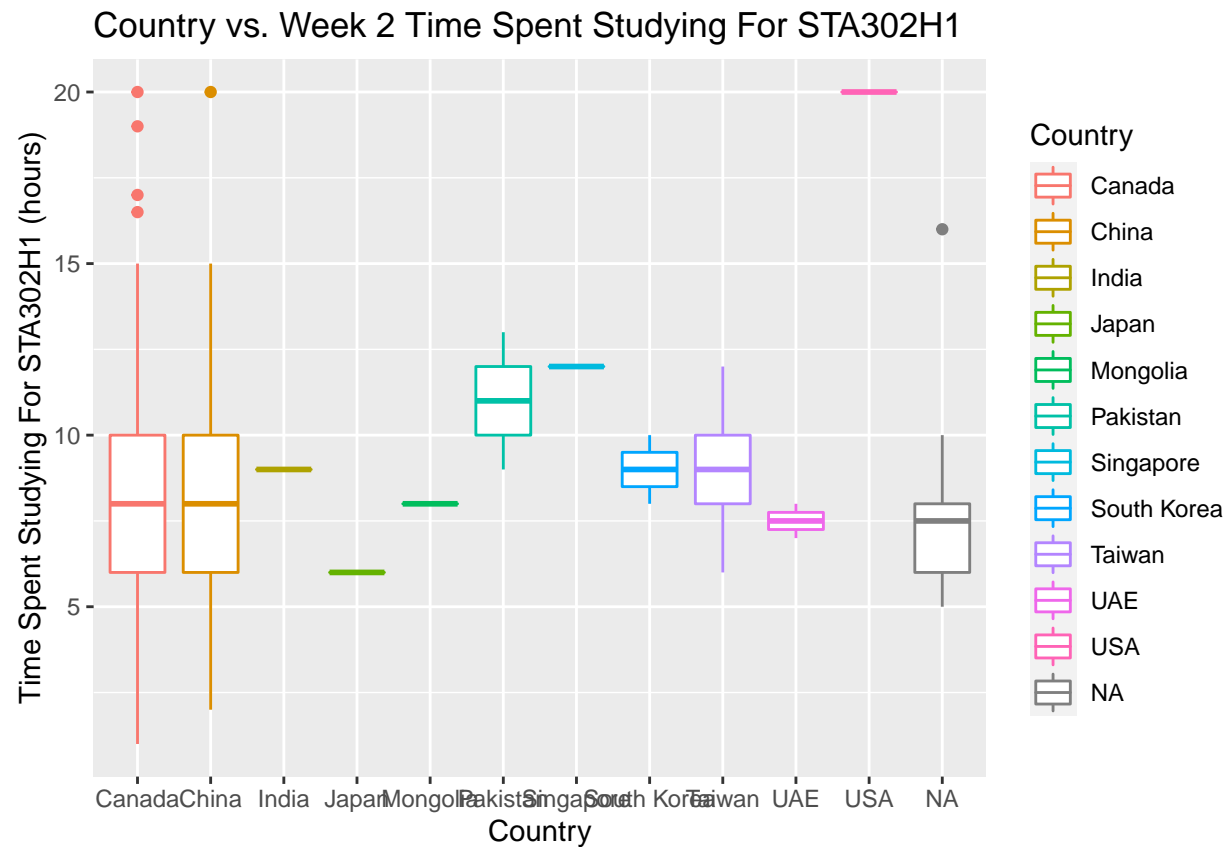


Country vs. Week 1 Time Spent Studying For STA302H1

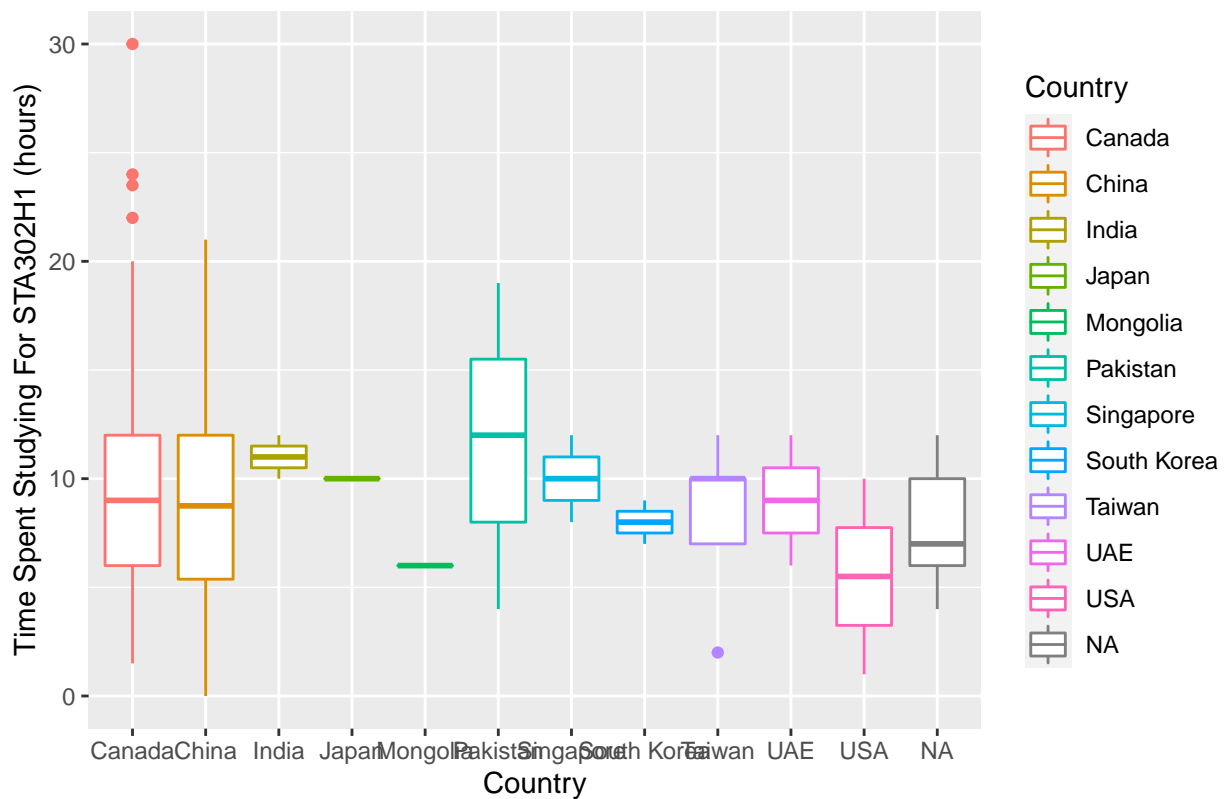


Histogram of Week 1 Time Spent Studying for STA302H1

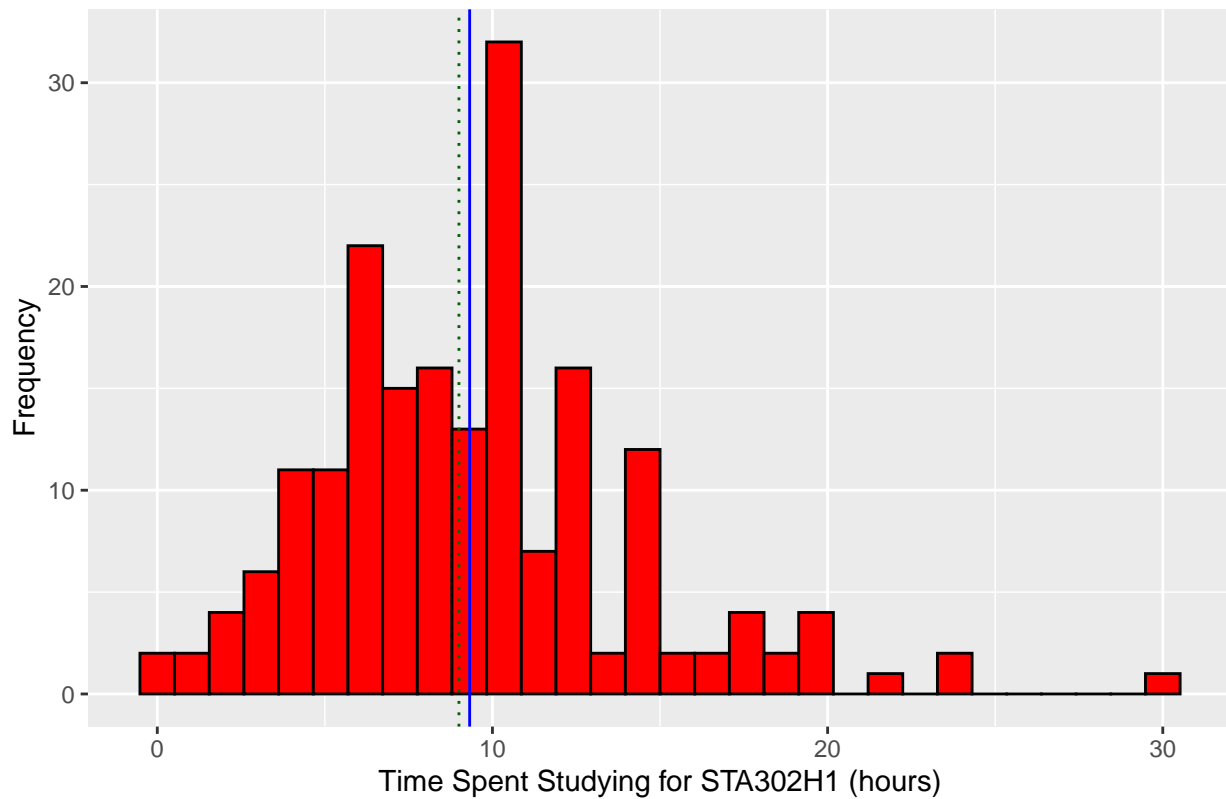




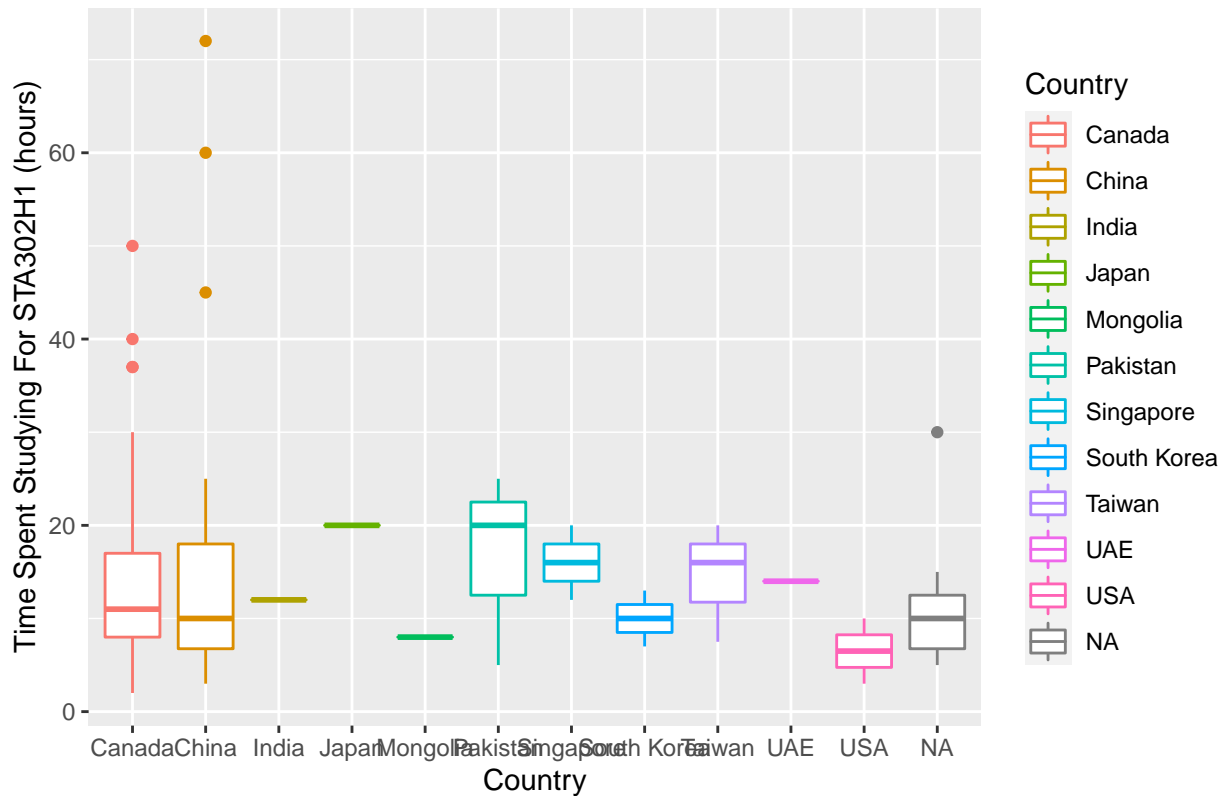
Country vs. Week 3 Time Spent Studying For STA302H1



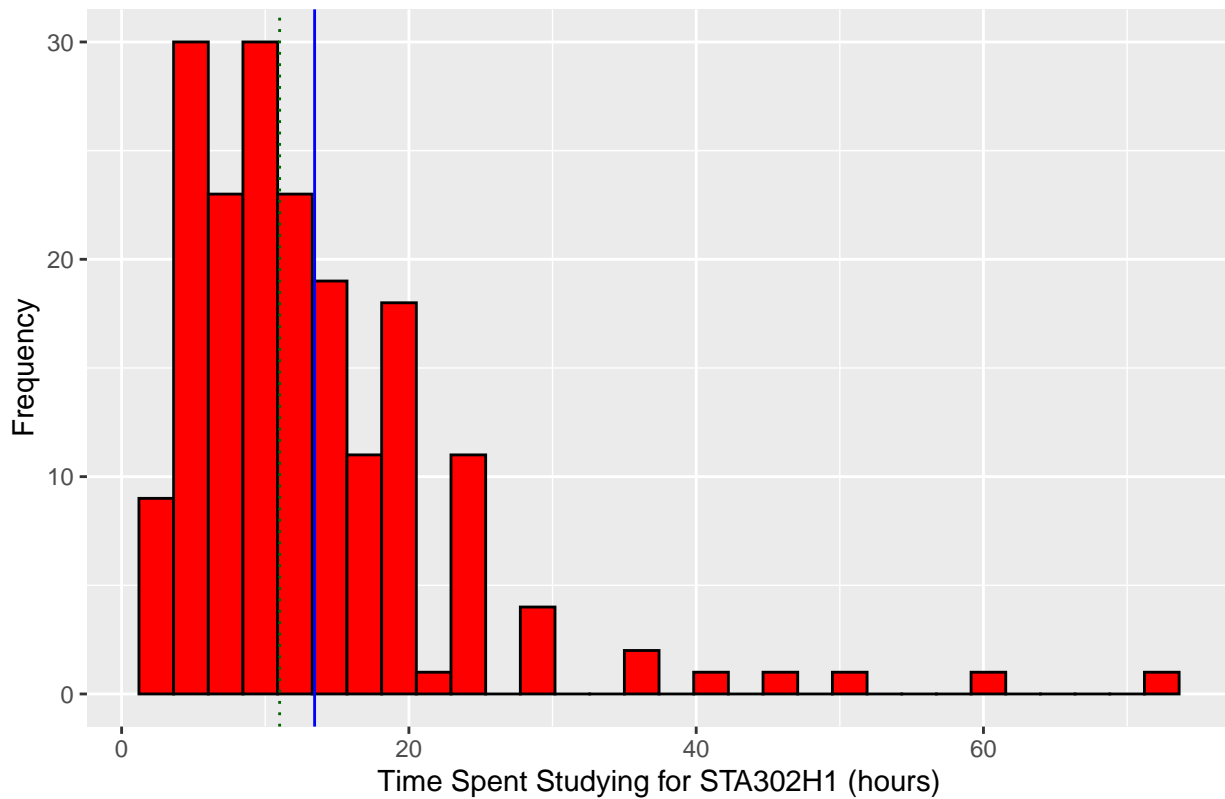
Histogram of Week 3 Time Spent Studying for STA302H1

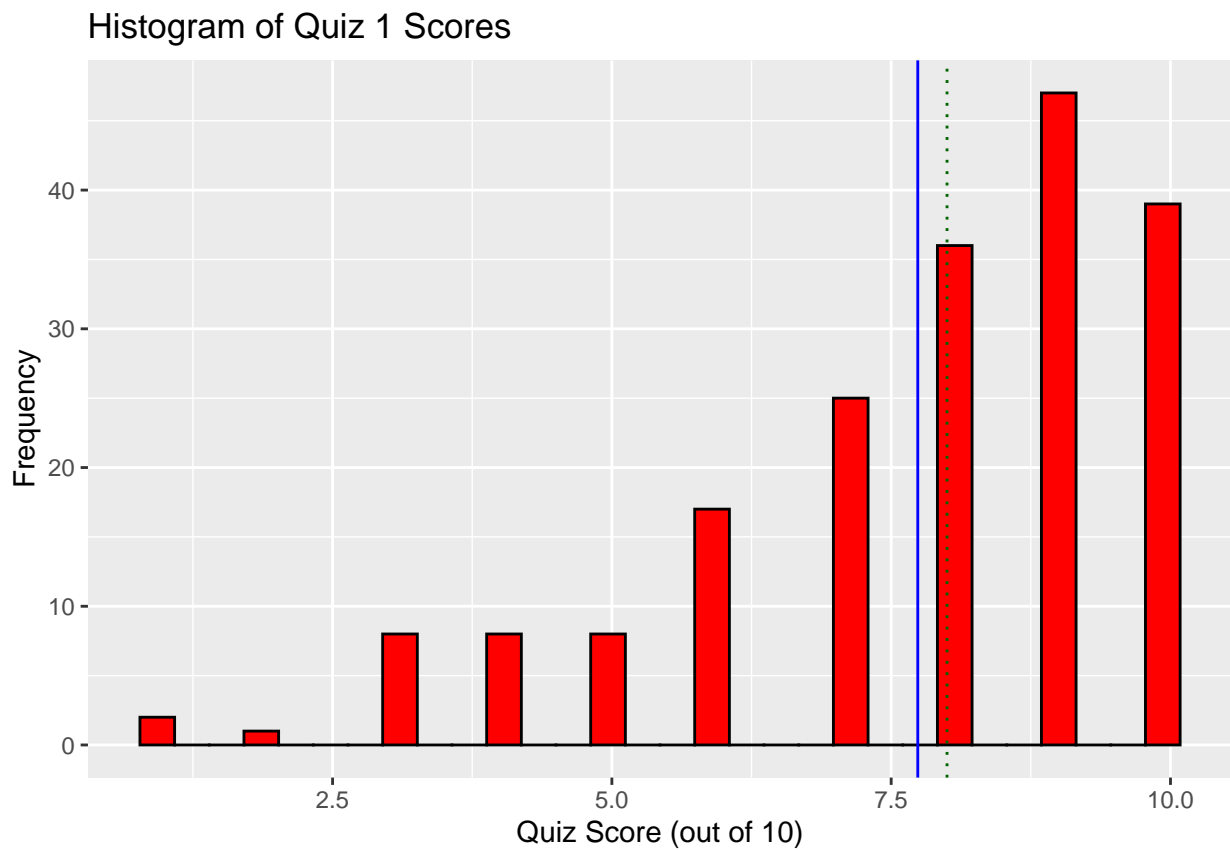
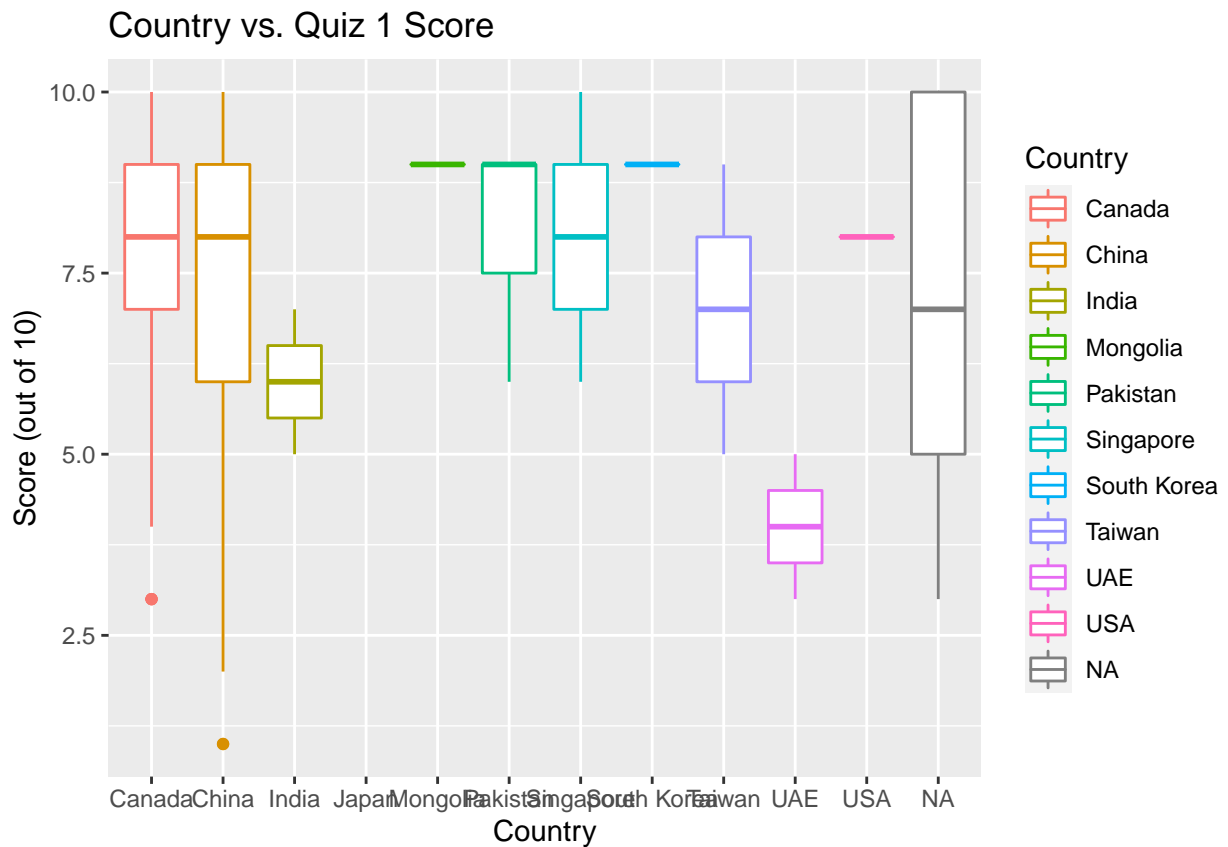


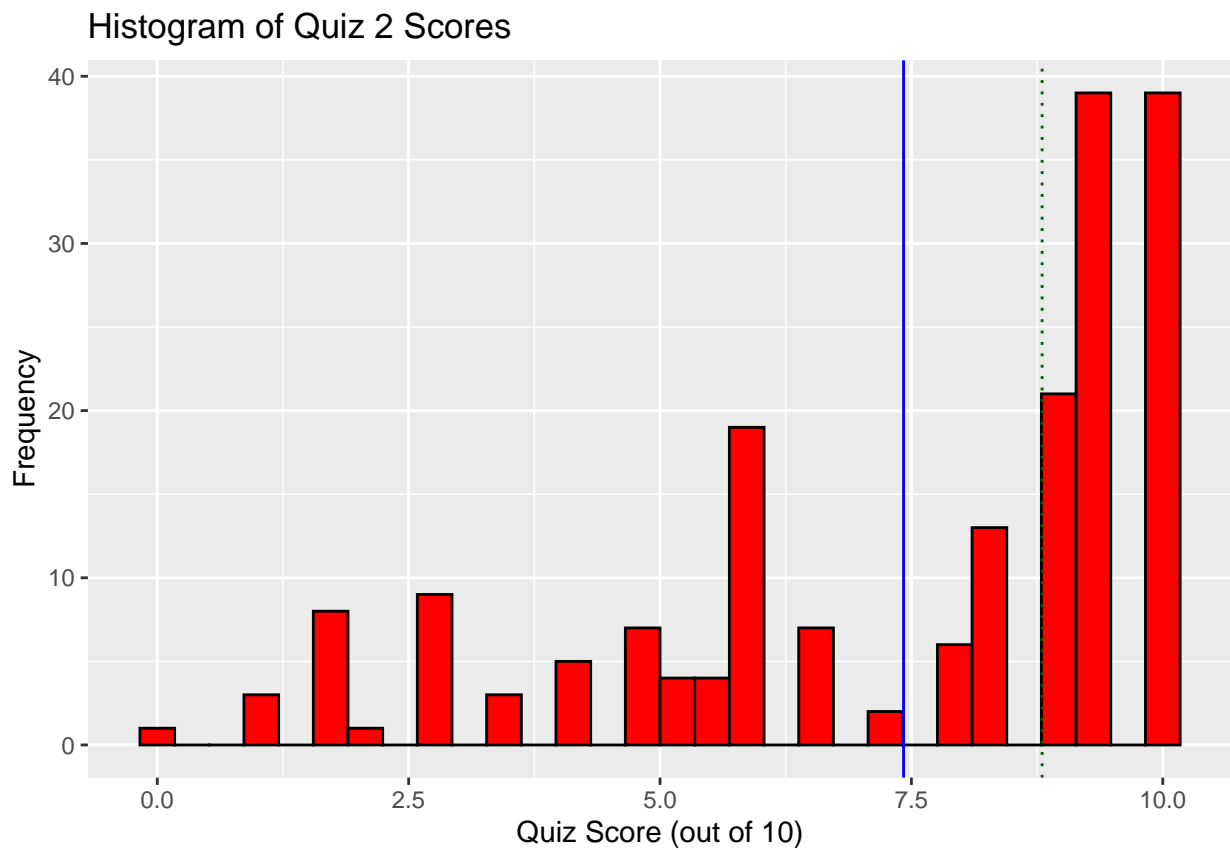
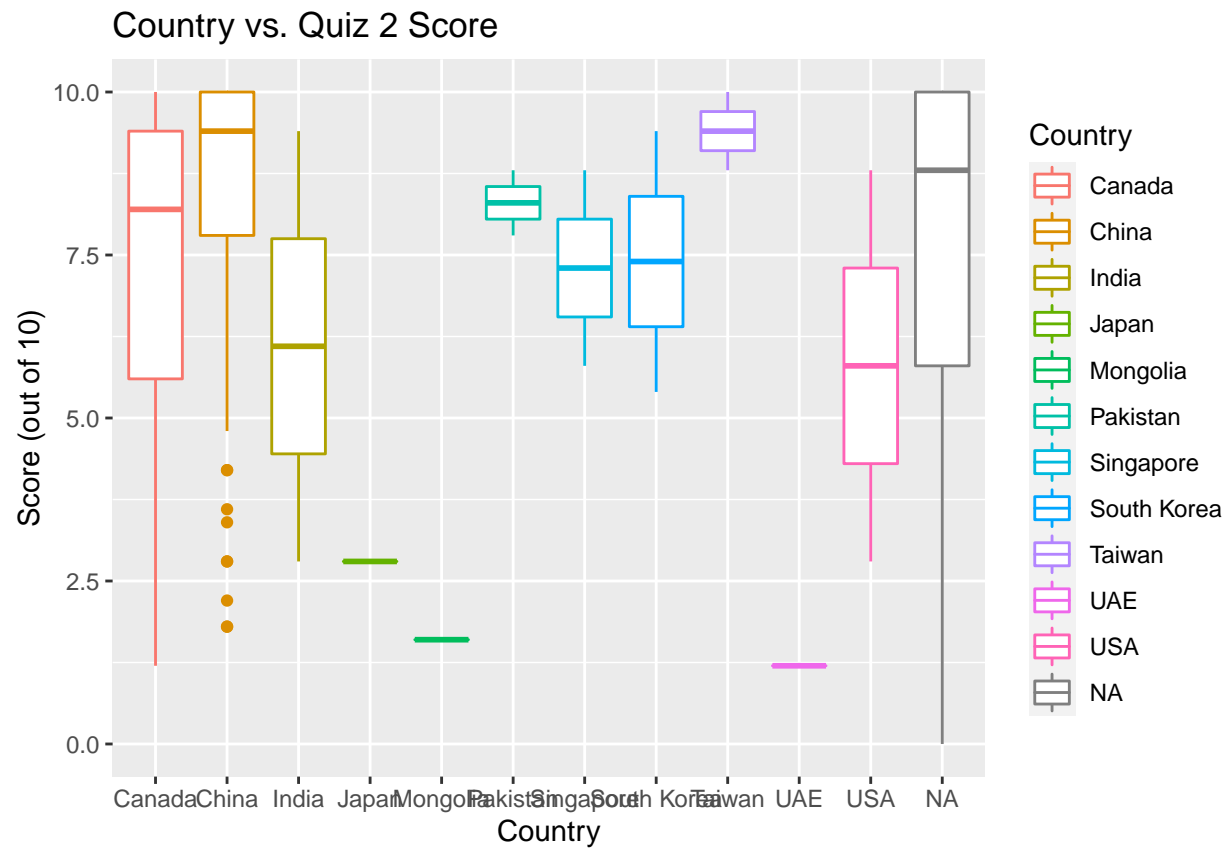
Country vs. Week 4 Time Spent Studying For STA302H1

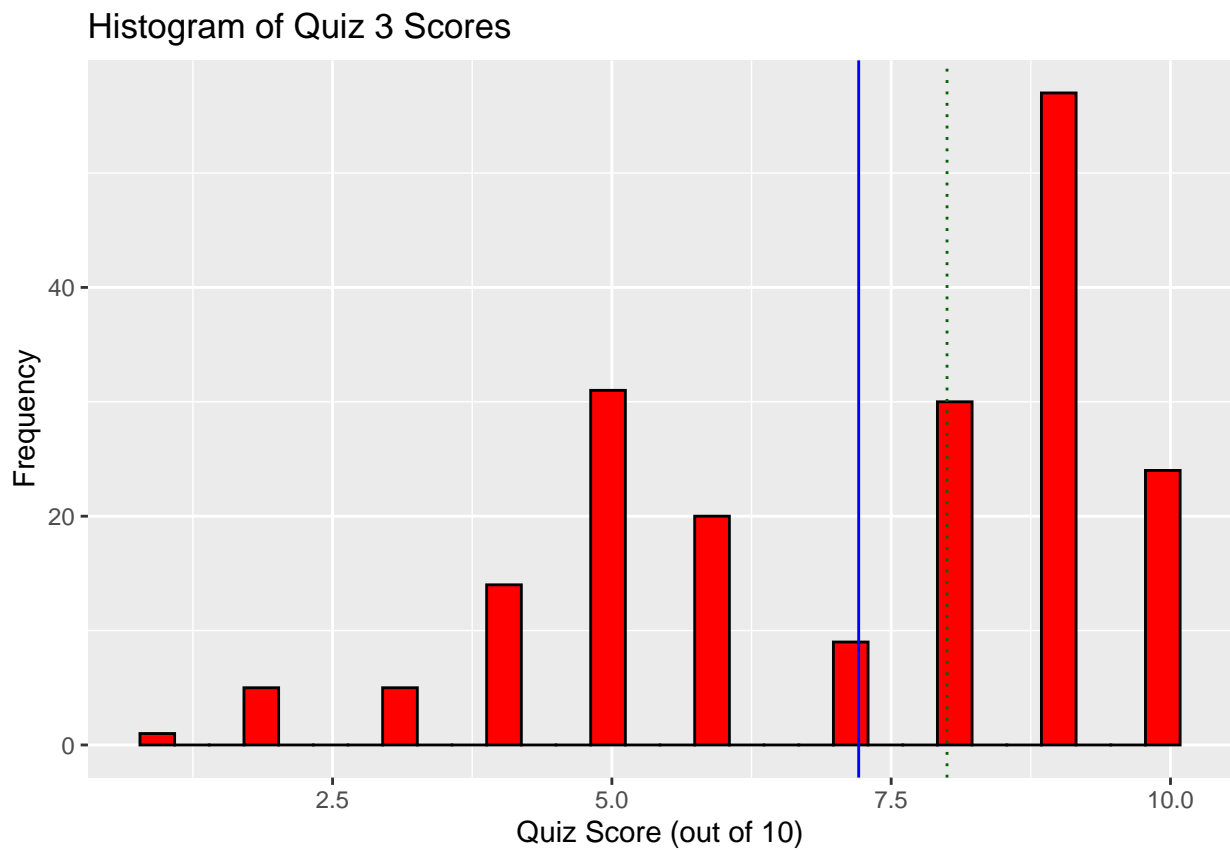
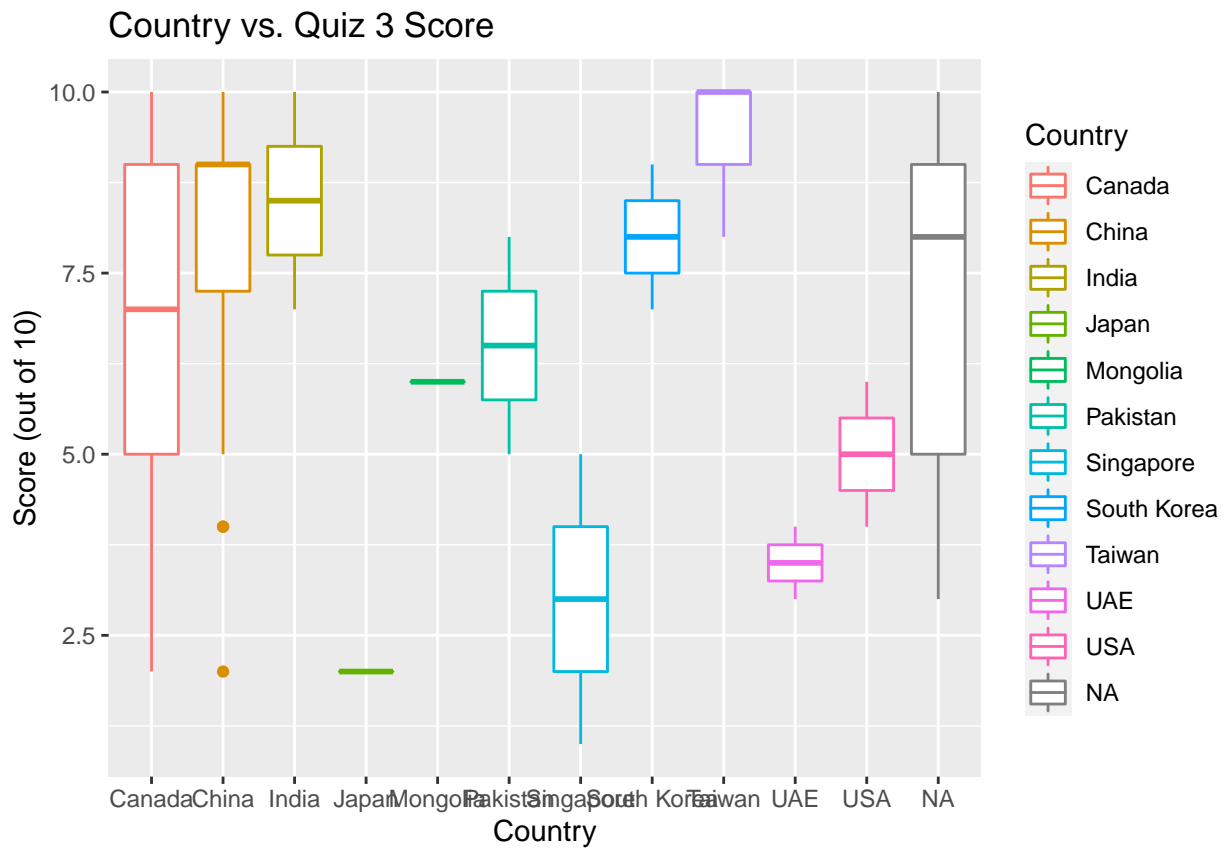


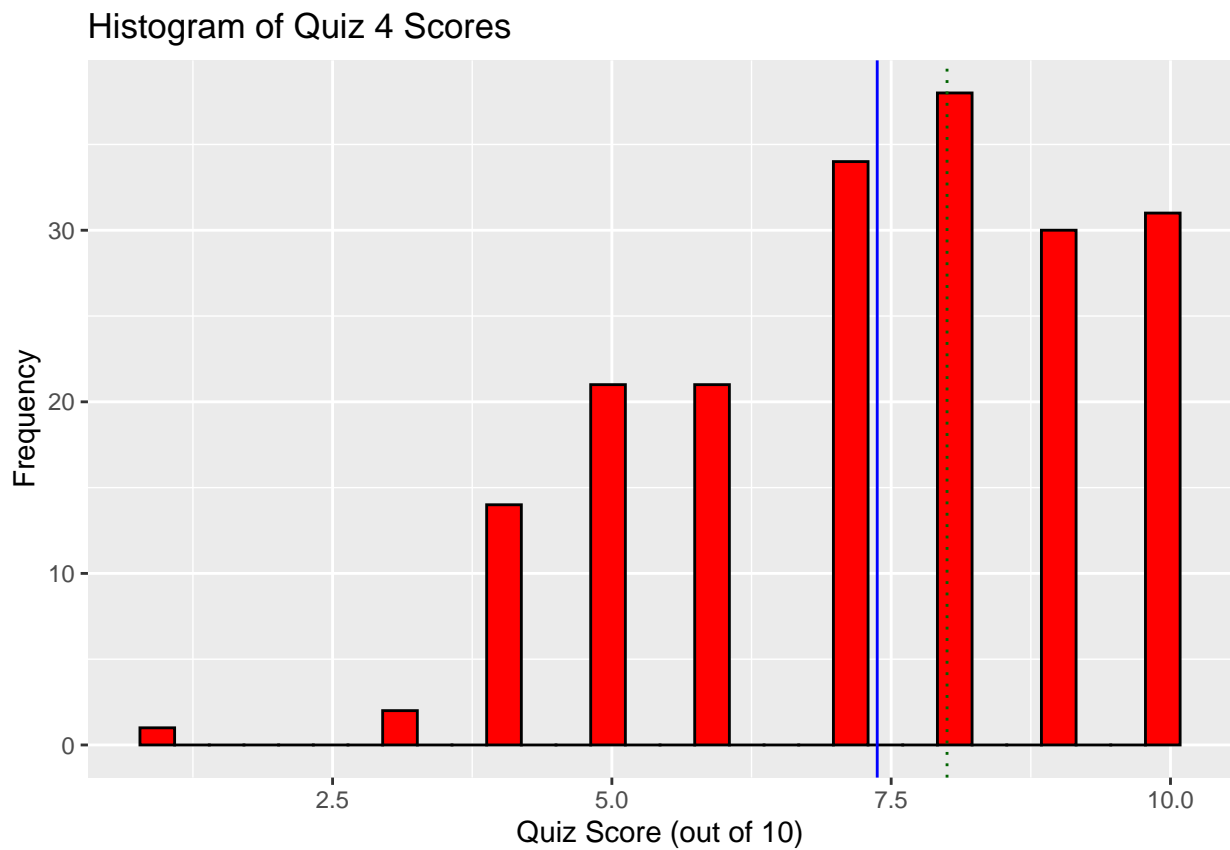
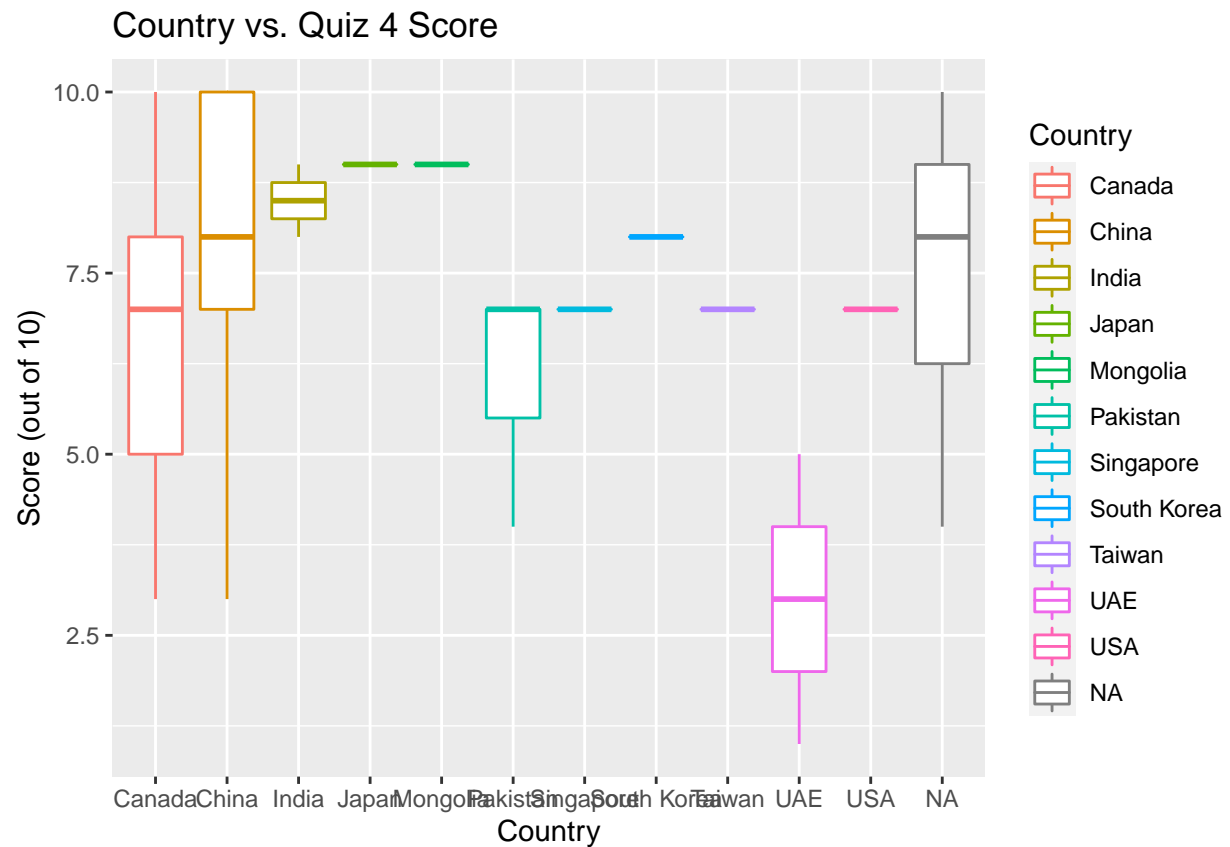
Histogram of Week 4 Time Spent Studying for STA302H1











5-Number Summary Statistics

```
summary(cleaned_sta302_performance_data2$COVID.hours..W1.)
```

##	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	NA's
##	0.0	1.0	1.0	3.7	2.0	168.0	21

```
summary(cleaned_sta302_performance_data2$COVID.hours..W2.)
```

##	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	NA's
##	0.000	1.000	1.000	2.869	2.000	40.000	19

```
summary(cleaned_sta302_performance_data2$COVID.hours..W3.)
```

##	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	NA's
##	0.000	0.500	1.000	2.227	2.000	24.000	11

```
summary(cleaned_sta302_performance_data2$COVID.hours..W4.)
```

##	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	NA's
##	0.000	1.000	1.500	2.917	3.000	50.000	13

```
summary(cleaned_sta302_performance_data2$STA302.hours..W1.)
```

##	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	NA's
##	0.000	5.000	7.000	7.539	9.000	28.000	21

```
summary(cleaned_sta302_performance_data2$STA302.hours..W2.)
```

##	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	NA's
##	1.000	6.000	8.000	8.403	10.000	20.000	19

```
summary(cleaned_sta302_performance_data2$STA302.hours..W3.)
```

##	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	NA's
##	0.00	6.00	9.00	9.32	12.00	30.00	10

```
summary(cleaned_sta302_performance_data2$STA302.hours..W4.)
```

##	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	NA's
##	2.00	7.00	11.00	13.44	16.00	72.00	13

```
summary(cleaned_sta302_performance_data2$Quiz_1_score)
```

```
##      Min. 1st Qu.  Median      Mean 3rd Qu.     Max.    NA's  
##    1.000   7.000   8.000   7.738   9.000  10.000      8
```

```
summary(cleaned_sta302_performance_data2$Quiz_2_score)
```

```
##      Min. 1st Qu.  Median      Mean 3rd Qu.     Max.    NA's  
##    0.000   5.800   8.800   7.422   9.400  10.000      8
```

```
summary(cleaned_sta302_performance_data2$Quiz_3_score)
```

```
##      Min. 1st Qu.  Median      Mean 3rd Qu.     Max.    NA's  
##    1.000   5.000   8.000   7.209   9.000  10.000      3
```

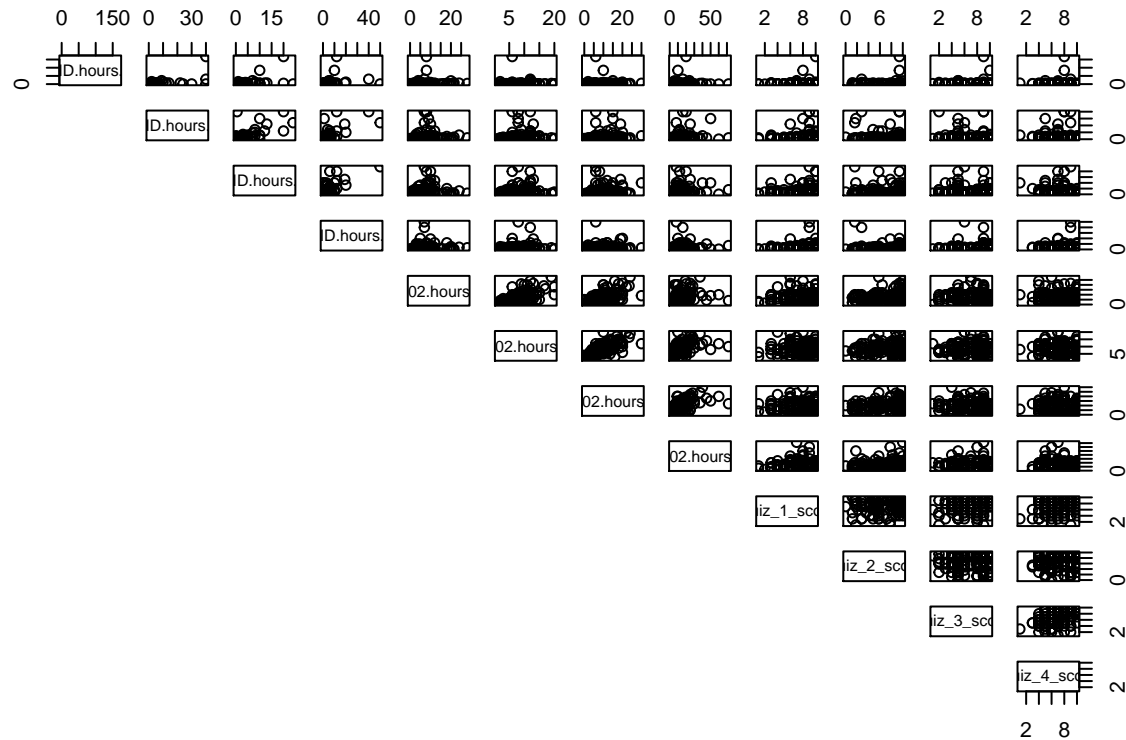
```
summary(cleaned_sta302_performance_data2$Quiz_4_score)
```

```
##      Min. 1st Qu.  Median      Mean 3rd Qu.     Max.    NA's  
##    1.000   6.000   8.000   7.375   9.000  10.000      7
```

Scatterplots

Comprehensive pairwise scatterplot

```
pairs(~COVID.hours..W1. + COVID.hours..W2. + COVID.hours..W3. + COVID.hours..W4. +
      STA302.hours..W1. + STA302.hours..W2. + STA302.hours..W3. + STA302.hours..W4. +
      Quiz_1_score + Quiz_2_score + Quiz_3_score + Quiz_4_score,
      data = cleaned_sta302_performance_data2, lower.panel = NULL)
```

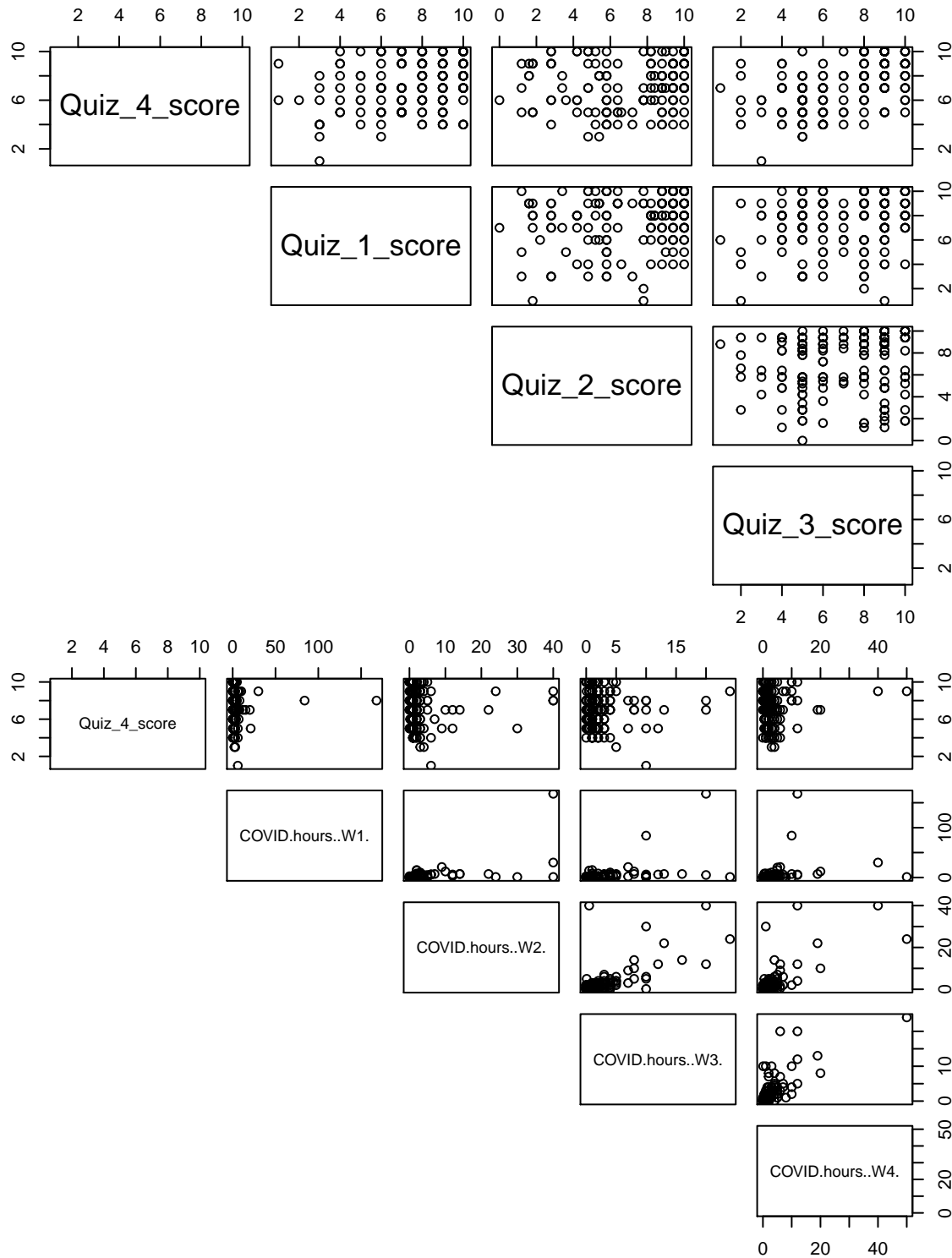


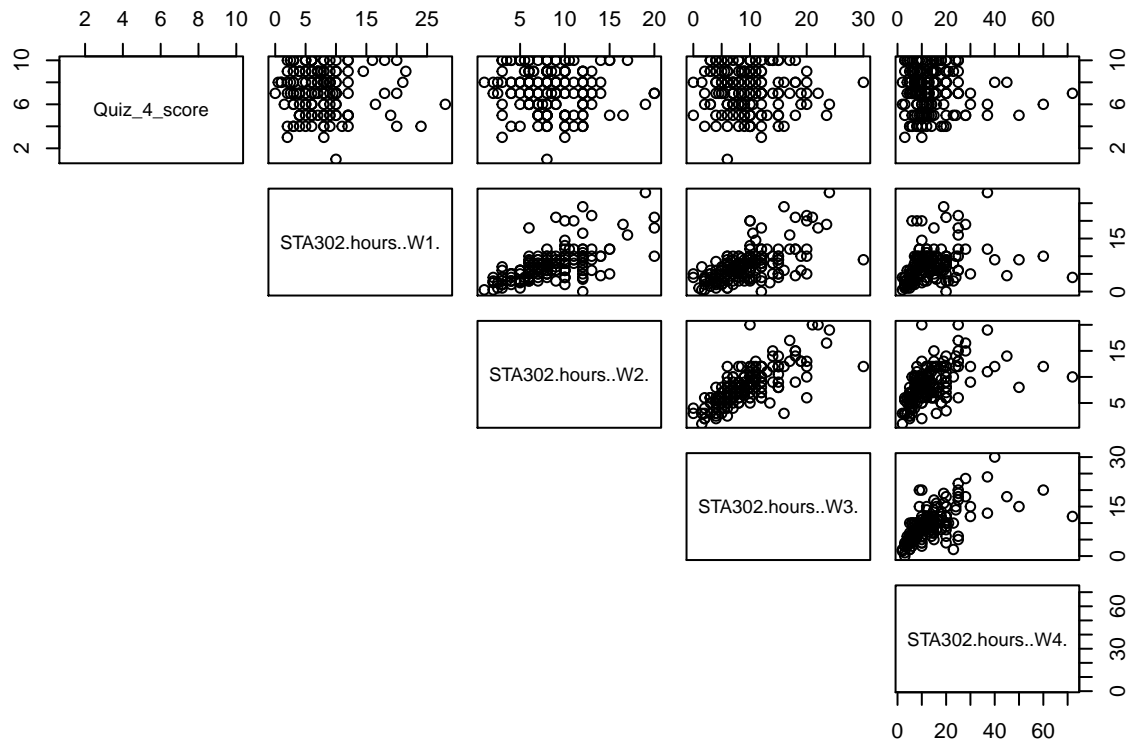
```
## GGally
# ggpairs -- removes bottom half of pairs plot
# ggpairs(data = cleaned_sta302_performance_data2)
```

Slightly Zoomed In Pairwise Scatterplots

We can zoom in a bit by creating 3 - 4 pairs() functions:

- quiz4 ~ quiz 1, 2, 3
- quiz4 ~ covid 1, 2, 3, 4
- quiz4 ~ sta302h1 1, 2, 3, 4





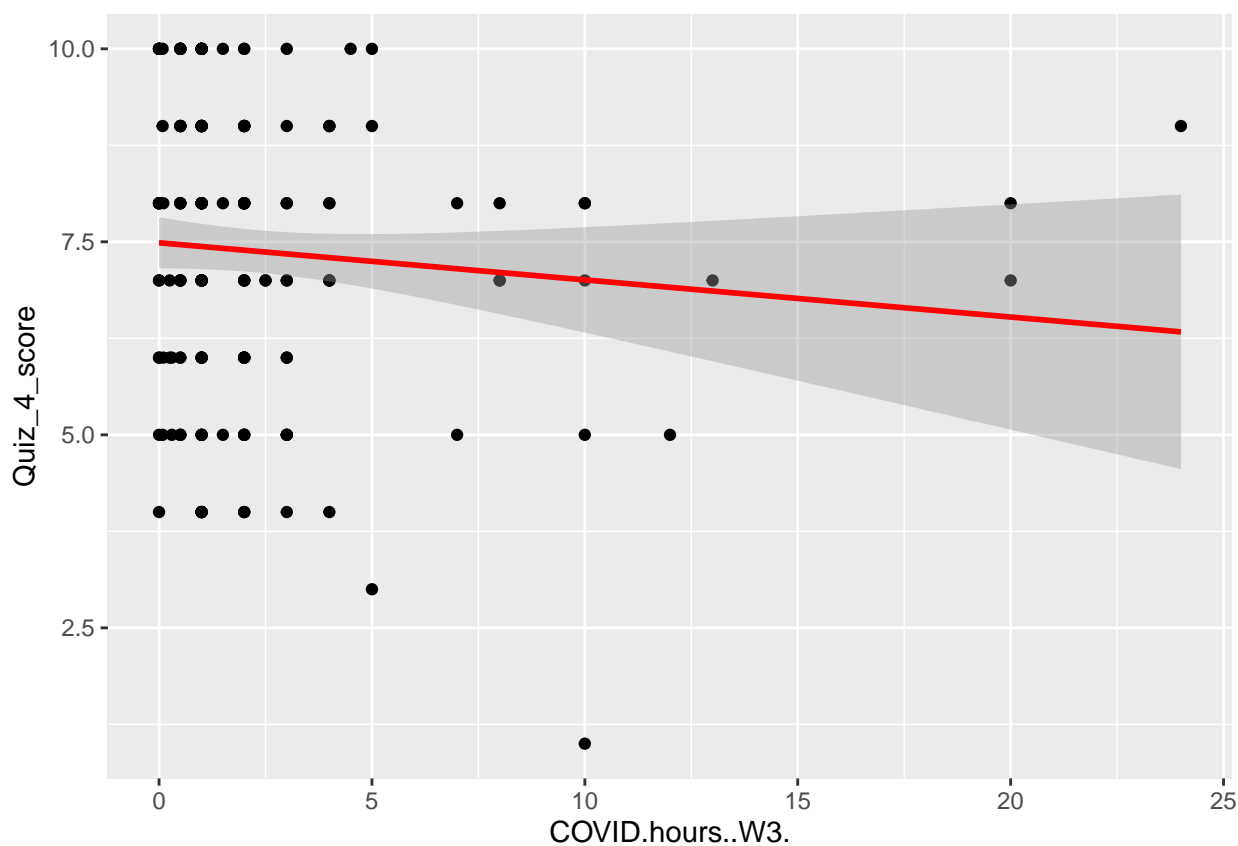
Top 4 - 5 Interesting Scatterplots

On page 28 “Correlation Matrix,” when I look at the row labelled “Q4” (Quiz 4), I obtained the top 4 - 5 predictor variables based on their correlation:

- Quiz 3 Score ($R = 0.55$), significant
- Quiz 1 Score ($R = 0.29$), significant
- Quiz 2 Score ($R = 0.19$), moderately significant
- Week 2 STA302H1 Hours ($R = -0.11$), not significant at all
- Week 3 COVID Hours ($R = -0.09$), not significant at all

Here are all of their scatterplots, linear regressions, and p-values.

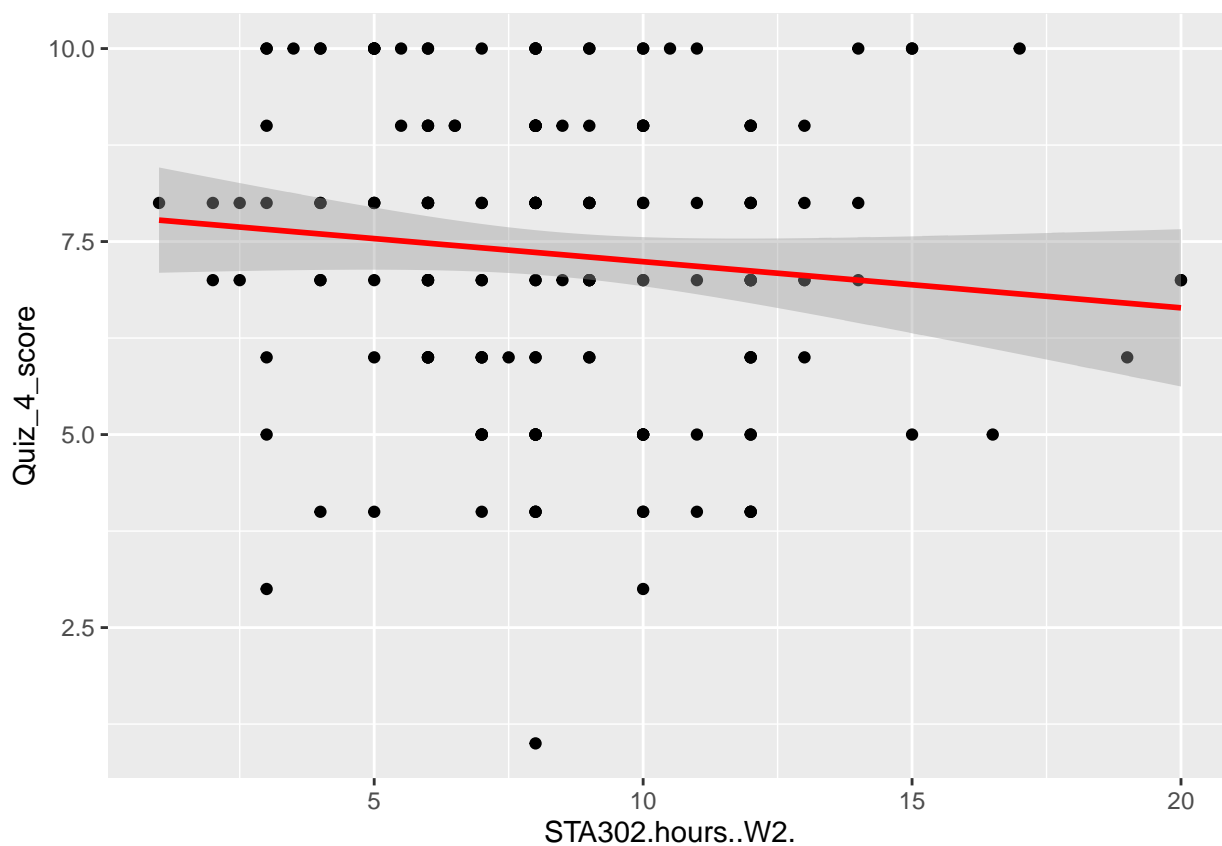
```
ggplot(data = cleaned_sta302_performance_data2, mapping = aes(x = COVID.hours..W3., y = Quiz_4_score)) +  
  geom_point() +  
  geom_smooth(method = "lm", col = "red", formula = y ~ x)
```



```
summary(lm(formula = Quiz_4_score ~ COVID.hours..W3.))$coefficients
```

```
##              Estimate Std. Error  t value    Pr(>|t|)  
## (Intercept)    7.4878594  0.16726635  44.766083 1.713615e-99  
## COVID.hours..W3. -0.0480875  0.04092781  -1.174935 2.415728e-01
```

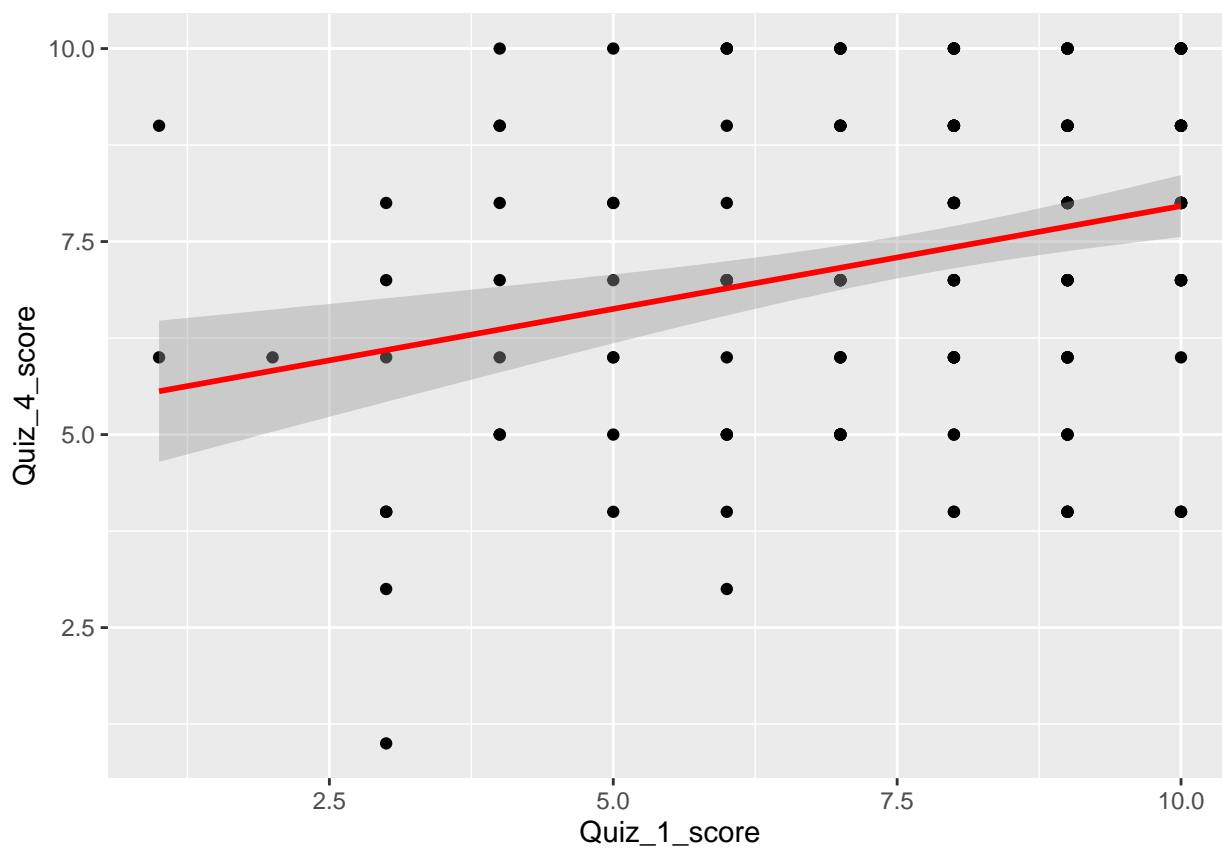
```
ggplot(data = cleaned_sta302_performance_data2, mapping = aes(x = STA302.hours..W2., y = Quiz_4_score))
  geom_point() +
  geom_smooth(method = "lm", col = "red", formula = y ~ x)
```



```
summary(lm(formula = Quiz_4_score ~ STA302.hours..W2.))$coefficients
```

```
##              Estimate Std. Error  t value    Pr(>|t|)
## (Intercept)   7.83737079 0.38459115 20.378448 7.564391e-48
## STA302.hours..W2. -0.05979501 0.04256155 -1.404907 1.618420e-01
```

```
ggplot(data = cleaned_sta302_performance_data2, mapping = aes(x = Quiz_1_score, y = Quiz_4_score)) +
  geom_point() +
  geom_smooth(method = "lm", col = "red", formula = y ~ x)
```

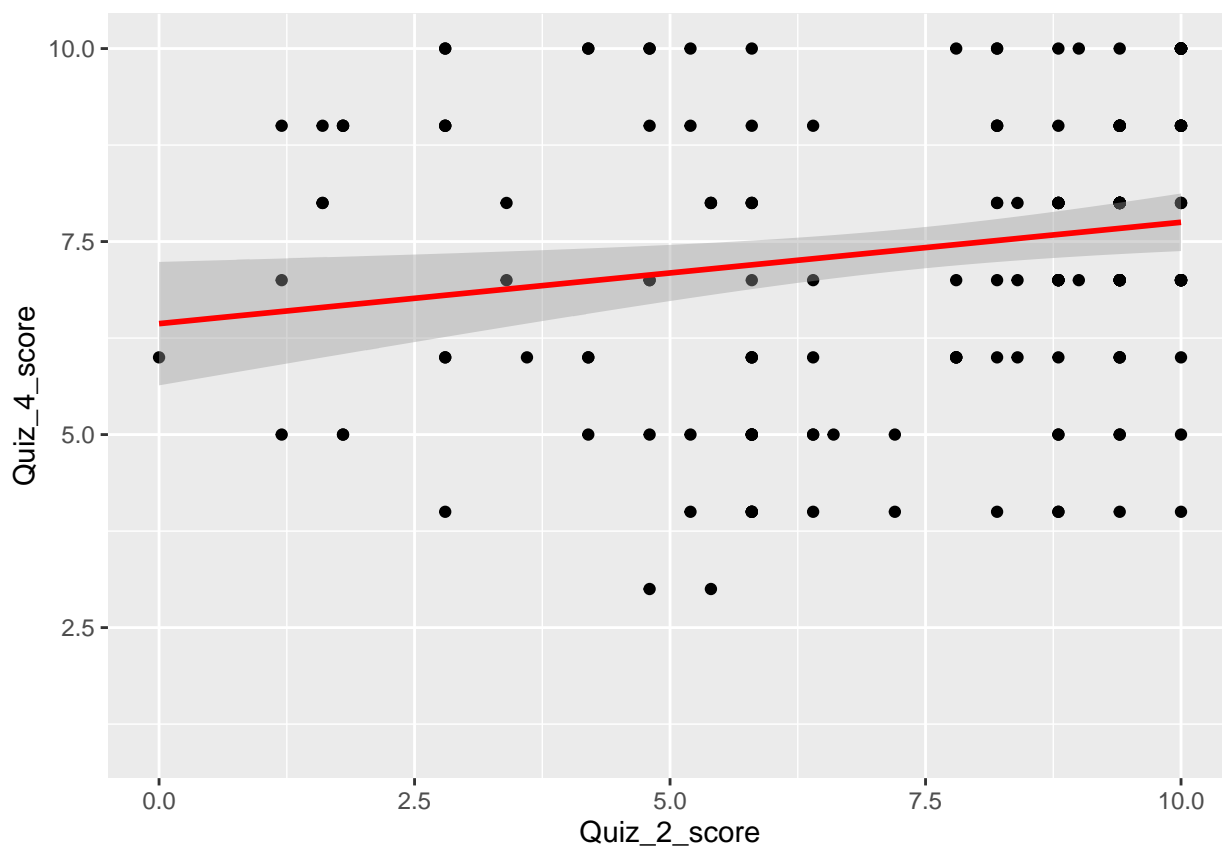


```
summary(lm(formula = Quiz_4_score ~ Quiz_1_score))$coefficients
```

```
##              Estimate Std. Error  t value    Pr(>|t|)
## (Intercept)  5.294618  0.52656215  10.05507 3.389243e-19
## Quiz_1_score  0.266566  0.06581747   4.05008 7.569858e-05
```



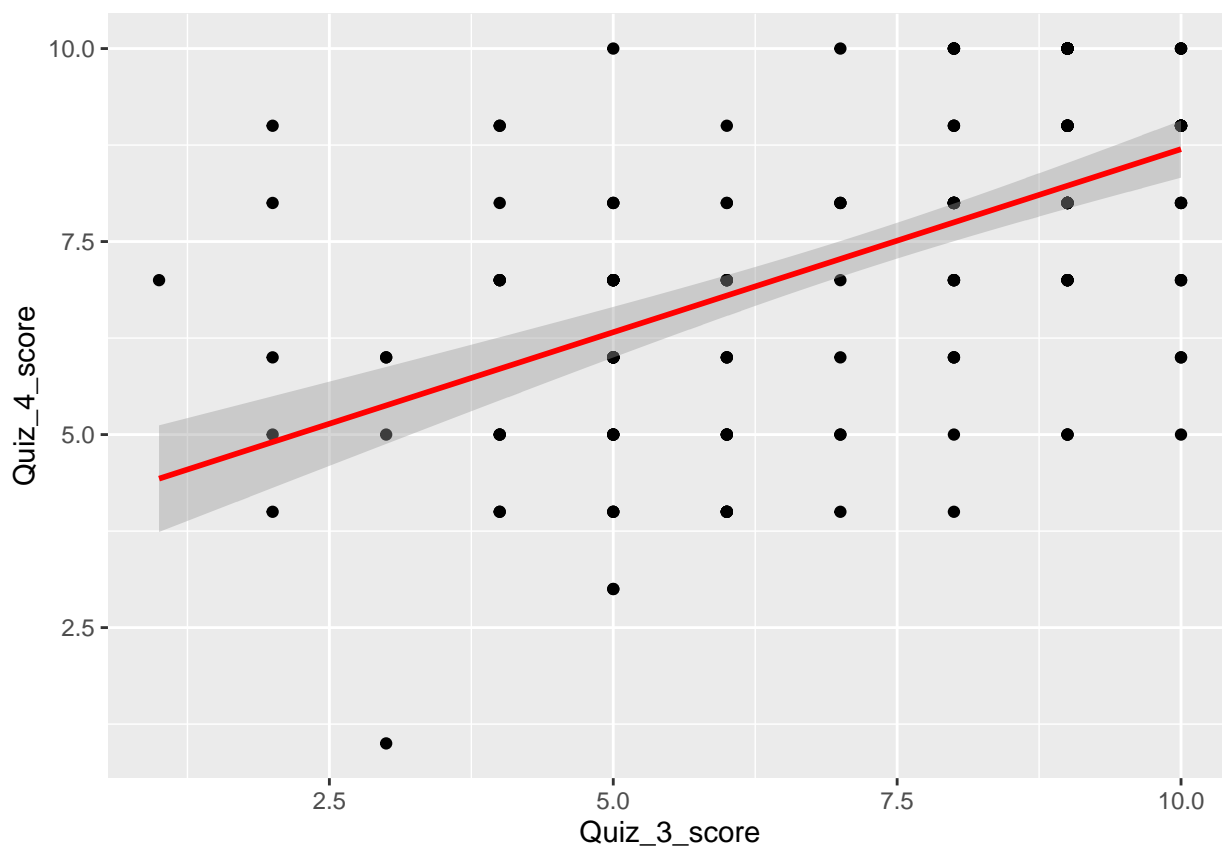
```
ggplot(data = cleaned_sta302_performance_data2, mapping = aes(x = Quiz_2_score, y = Quiz_4_score)) +
  geom_point() +
  geom_smooth(method = "lm", col = "red", formula = y ~ x)
```



```
summary(lm(formula = Quiz_4_score ~ Quiz_2_score))$coefficients
```

```
##           Estimate Std. Error  t value    Pr(>|t|)
## (Intercept)  6.4369424  0.40505781 15.891417 3.115470e-36
## Quiz_2_score  0.1312884  0.05134437  2.557017 1.137315e-02
```

```
ggplot(data = cleaned_sta302_performance_data2, mapping = aes(x = Quiz_3_score, y = Quiz_4_score)) +  
  geom_point() +  
  geom_smooth(method = "lm", col = "red", formula = y ~ x)
```



```
summary(lm(formula = Quiz_4_score ~ Quiz_3_score))$coefficients
```

```
##           Estimate Std. Error t value    Pr(>|t|)  
## (Intercept)  3.9548096 0.40042387  9.876558 8.520117e-19  
## Quiz_3_score  0.4742257 0.05296413  8.953715 3.324360e-16
```

I'll back up my choices with their correlations (R value).

Correlation Matrix

All Countries

We can find the correlation matrix to determine candidate significant predictor values.

##		W1COV	W2COV	W3COV	W4COV	W1302	W2302	W3302	W4302	Q1	Q2	Q3	Q4
##	W1COV	1.00	0.56	0.48	0.27	0.04	-0.03	-0.01	0.04	0.08	0.06	0.07	0.02
##	W2COV	0.56	1.00	0.67	0.71	0.05	0.08	0.17	0.19	0.13	-0.10	-0.12	-0.01
##	W3COV	0.48	0.67	1.00	0.72	0.08	0.08	0.14	0.13	0.09	-0.07	-0.11	-0.09
##	W4COV	0.27	0.71	0.72	1.00	0.02	0.07	0.09	0.07	0.12	-0.10	0.02	0.06
##	W1302	0.04	0.05	0.08	0.02	1.00	0.61	0.58	0.30	0.05	0.13	-0.04	-0.08
##	W2302	-0.03	0.08	0.08	0.07	0.61	1.00	0.70	0.48	0.00	0.06	-0.05	-0.11
##	W3302	-0.01	0.17	0.14	0.09	0.58	0.70	1.00	0.62	-0.01	0.08	-0.12	-0.08
##	W4302	0.04	0.19	0.13	0.07	0.30	0.48	0.62	1.00	-0.01	0.04	-0.05	-0.06
##	Q1	0.08	0.13	0.09	0.12	0.05	0.00	-0.01	-0.01	1.00	0.25	0.29	0.29
##	Q2	0.06	-0.10	-0.07	-0.10	0.13	0.06	0.08	0.04	0.25	1.00	0.23	0.19
##	Q3	0.07	-0.12	-0.11	0.02	-0.04	-0.05	-0.12	-0.05	0.29	0.23	1.00	0.55
##	Q4	0.02	-0.01	-0.09	0.06	-0.08	-0.11	-0.08	-0.06	0.29	0.19	0.55	1.00

By Individual Country

We could also create separate correlation matrices for each country.

```
display_correlation_by_country(canada)
```

```
##          W1COV W2COV W3COV W4COV W1302 W2302 W3302 W4302    Q1    Q2    Q3    Q4
## W1COV    1.00  0.60  0.72  0.39 -0.01 -0.05 -0.05  0.10  0.10  0.06  0.11  0.06
## W2COV    0.60  1.00  0.67  0.72  0.00  0.02  0.15  0.29  0.13 -0.07 -0.06  0.05
## W3COV    0.72  0.67  1.00  0.61 -0.01 -0.01  0.23  0.31  0.09  0.03 -0.08 -0.07
## W4COV    0.39  0.72  0.61  1.00 -0.04  0.04  0.16  0.02  0.10 -0.04  0.10  0.04
## W1302   -0.01  0.00 -0.01 -0.04  1.00  0.70  0.64  0.55 -0.09  0.09 -0.02 -0.16
## W2302   -0.05  0.02 -0.01  0.04  0.70  1.00  0.73  0.62 -0.15 -0.09 -0.01 -0.11
## W3302   -0.05  0.15  0.23  0.16  0.64  0.73  1.00  0.68 -0.09  0.05 -0.13 -0.12
## W4302    0.10  0.29  0.31  0.02  0.55  0.62  0.68  1.00 -0.12 -0.08 -0.09 -0.12
## Q1       0.10  0.13  0.09  0.10 -0.09 -0.15 -0.09 -0.12  1.00  0.16  0.38  0.35
## Q2       0.06 -0.07  0.03 -0.04  0.09 -0.09  0.05 -0.08  0.16  1.00  0.07  0.14
## Q3       0.11 -0.06 -0.08  0.10 -0.02 -0.01 -0.13 -0.09  0.38  0.07  1.00  0.50
## Q4       0.06  0.05 -0.07  0.04 -0.16 -0.11 -0.12 -0.12  0.35  0.14  0.50  1.00
```

```
display_correlation_by_country(china)
```

```
##          W1COV W2COV W3COV W4COV W1302 W2302 W3302 W4302    Q1    Q2    Q3    Q4
## W1COV    1.00  0.70  0.51  0.40  0.12  0.08  0.05 -0.07  0.06  0.09  0.10 -0.01
## W2COV    0.70  1.00  0.67  0.67  0.25  0.34  0.27  0.08  0.14 -0.05  0.05 -0.12
## W3COV    0.51  0.67  1.00  0.62  0.15  0.28  0.19  0.04  0.14  0.04  0.20 -0.19
## W4COV    0.40  0.67  0.62  1.00  0.13  0.25  0.19  0.28  0.24  0.07  0.08 -0.10
## W1302    0.12  0.25  0.15  0.13  1.00  0.56  0.49  0.02  0.21  0.28 -0.06  0.07
## W2302    0.08  0.34  0.28  0.25  0.56  1.00  0.76  0.42  0.15  0.27 -0.02 -0.08
## W3302    0.05  0.27  0.19  0.19  0.49  0.76  1.00  0.57  0.11  0.14 -0.07  0.00
## W4302   -0.07  0.08  0.04  0.28  0.02  0.42  0.57  1.00  0.07  0.15  0.04 -0.03
## Q1       0.06  0.14  0.14  0.24  0.21  0.15  0.11  0.07  1.00  0.44  0.36  0.25
## Q2       0.09 -0.05  0.04  0.07  0.28  0.27  0.14  0.15  0.44  1.00  0.19  0.15
## Q3       0.10  0.05  0.20  0.08 -0.06 -0.02 -0.07  0.04  0.36  0.19  1.00  0.61
## Q4      -0.01 -0.12 -0.19 -0.10  0.07 -0.08  0.00 -0.03  0.25  0.15  0.61  1.00
```

```
display_correlation_by_country(other)
```

```
##          W1COV W2COV W3COV W4COV W1302 W2302 W3302 W4302    Q1    Q2    Q3    Q4
## W1COV    1.00  0.33  0.37  0.10  0.43 -0.20  0.29  0.60 -0.26 -0.11 -0.54 -0.15
## W2COV    0.33  1.00  0.90  0.87  0.29  0.17  0.24  0.18  0.14 -0.19 -0.24  0.03
## W3COV    0.37  0.90  1.00  0.82  0.36  0.09  0.03  0.10  0.12 -0.21 -0.26 -0.02
## W4COV    0.10  0.87  0.82  1.00  0.18  0.04  0.04  0.01  0.12 -0.25 -0.10  0.22
## W1302    0.43  0.29  0.36  0.18  1.00  0.01  0.40  0.35 -0.16 -0.16  0.02  0.00
## W2302   -0.20  0.17  0.09  0.04  0.01  1.00  0.34  0.19  0.09  0.23 -0.02 -0.01
## W3302    0.29  0.24  0.03  0.04  0.40  0.34  1.00  0.72 -0.21  0.15 -0.06  0.08
## W4302    0.60  0.18  0.10  0.01  0.35  0.19  0.72  1.00 -0.05  0.10 -0.28  0.02
## Q1      -0.26  0.14  0.12  0.12 -0.16  0.09 -0.21 -0.05  1.00  0.26  0.29  0.45
## Q2      -0.11 -0.19 -0.21 -0.25 -0.16  0.23  0.15  0.10  0.26  1.00  0.49  0.24
## Q3      -0.54 -0.24 -0.26 -0.10  0.02 -0.02 -0.06 -0.28  0.29  0.49  1.00  0.49
## Q4      -0.15  0.03 -0.02  0.22  0.00 -0.01  0.08  0.02  0.45  0.24  0.49  1.00
```

Select Predictor Variables Based on Criterion

Here are our tentative models:

- quiz4 ~ quiz 1, 2, 3 grades (out of 10)
- quiz4 ~ weeks 1, 2, 3, 4 covid19 hours
- quiz4 ~ weeks 1, 2, 3, 4 sta302h1 hours

```
quiz_grades.fit = lm(quiz4 ~ quiz1 + quiz2 + quiz3)
step = stepAIC(quiz_grades.fit, direction = "both")
```

```
## Start:  AIC=136.78
## quiz4 ~ quiz1 + quiz2 + quiz3
##
##           Df Sum of Sq  RSS   AIC
## - quiz1   1      0.294 352.21 134.90
## - quiz2   1      0.637 352.55 135.04
## <none>                    351.92 136.78
## - quiz3   1    117.594 469.51 176.00
##
## Step:  AIC=134.9
## quiz4 ~ quiz2 + quiz3
##
##           Df Sum of Sq  RSS   AIC
## - quiz2   1      0.806 353.02 133.22
## <none>                    352.21 134.90
## + quiz1   1      0.294 351.92 136.78
## - quiz3   1    132.862 485.07 178.67
##
## Step:  AIC=133.22
## quiz4 ~ quiz3
##
##           Df Sum of Sq  RSS   AIC
## <none>                    353.02 133.22
## + quiz2   1      0.806 352.21 134.90
## + quiz1   1      0.463 352.55 135.04
## - quiz3   1    144.341 497.36 180.24
```

```
step$anova
```

```
## Stepwise Model Path
## Analysis of Deviance Table
##
## Initial Model:
## quiz4 ~ quiz1 + quiz2 + quiz3
##
## Final Model:
## quiz4 ~ quiz3
##
##
##           Step Df  Deviance Resid. Df Resid. Dev    AIC
## 1              139    351.9160 136.7783
```

## 2 - quiz1	1	0.2940850	140	352.2101	134.8978
## 3 - quiz2	1	0.8059047	141	353.0160	133.2246

```

quiz_grades.fit2 = lm(
  quiz4 ~ quiz1 + quiz2 + quiz3 +
    I(quiz1 ^ 2) + I(quiz2 ^ 2) + I(quiz3 ^ 2) +
    I(quiz1 * quiz2) + I(quiz1 * quiz3) + I(quiz2 * quiz3))
step2 = stepAIC(quiz_grades.fit2, direction = "both")

## Start:  AIC=132.25
## quiz4 ~ quiz1 + quiz2 + quiz3 + I(quiz1^2) + I(quiz2^2) + I(quiz3^2) +
##      I(quiz1 * quiz2) + I(quiz1 * quiz3) + I(quiz2 * quiz3)
##
##
##      Df Sum of Sq    RSS    AIC
## - quiz2      1    0.1838 313.68 130.33
## - quiz3      1    0.6332 314.13 130.54
## - I(quiz1^2)    1    0.8903 314.39 130.65
## - I(quiz1 * quiz2) 1    3.4736 316.97 131.82
## - quiz1      1    4.1656 317.67 132.14
## <none>                      313.50 132.25
## - I(quiz1 * quiz3) 1    7.4338 320.93 133.60
## - I(quiz2 * quiz3) 1    7.4650 320.96 133.61
## - I(quiz2^2)    1    9.5323 323.03 134.53
## - I(quiz3^2)    1   13.5471 327.05 136.30
##
## Step:  AIC=130.33
## quiz4 ~ quiz1 + quiz3 + I(quiz1^2) + I(quiz2^2) + I(quiz3^2) +
##      I(quiz1 * quiz2) + I(quiz1 * quiz3) + I(quiz2 * quiz3)
##
##
##      Df Sum of Sq    RSS    AIC
## - quiz3      1    0.5284 314.21 128.57
## - I(quiz1^2)    1    0.7837 314.47 128.69
## - I(quiz1 * quiz2) 1    3.3983 317.08 129.87
## - quiz1      1    4.0467 317.73 130.16
## <none>                      313.68 130.33
## - I(quiz1 * quiz3) 1    7.2927 320.98 131.62
## - I(quiz2 * quiz3) 1    7.4348 321.12 131.68
## + quiz2      1    0.1838 313.50 132.25
## - I(quiz3^2)    1   13.4583 327.14 134.34
## - I(quiz2^2)    1   20.2423 333.93 137.27
##
## Step:  AIC=128.57
## quiz4 ~ quiz1 + I(quiz1^2) + I(quiz2^2) + I(quiz3^2) + I(quiz1 *
##      quiz2) + I(quiz1 * quiz3) + I(quiz2 * quiz3)
##
##
##      Df Sum of Sq    RSS    AIC
## - I(quiz1^2)    1    0.878 315.09 126.97
## - I(quiz1 * quiz2) 1    4.159 318.37 128.45
## - quiz1      1    4.395 318.61 128.56
## <none>                      314.21 128.57
## - I(quiz2 * quiz3) 1    7.084 321.30 129.76
## - I(quiz1 * quiz3) 1    7.633 321.84 130.00
## + quiz3      1    0.528 313.68 130.33
## + quiz2      1    0.079 314.13 130.54
## - I(quiz2^2)    1   19.720 333.93 135.28
## - I(quiz3^2)    1   49.111 363.32 147.34

```

```
##
## Step: AIC=126.97
## quiz4 ~ quiz1 + I(quiz2^2) + I(quiz3^2) + I(quiz1 * quiz2) +
## I(quiz1 * quiz3) + I(quiz2 * quiz3)
##
##           Df Sum of Sq    RSS    AIC
## - I(quiz1 * quiz2)  1      3.282 318.37 126.45
## <none>                                315.09 126.97
## - I(quiz1 * quiz3)  1      6.807 321.90 128.03
## + I(quiz1^2)        1      0.878 314.21 128.57
## + quiz3             1      0.623 314.47 128.69
## + quiz2             1      0.013 315.08 128.97
## - I(quiz2 * quiz3)  1      9.832 324.92 129.37
## - quiz1             1     10.570 325.66 129.69
## - I(quiz2^2)        1     18.843 333.93 133.28
## - I(quiz3^2)        1     48.557 363.65 145.47
##
## Step: AIC=126.45
## quiz4 ~ quiz1 + I(quiz2^2) + I(quiz3^2) + I(quiz1 * quiz3) +
## I(quiz2 * quiz3)
##
##           Df Sum of Sq    RSS    AIC
## <none>                                318.37 126.45
## + I(quiz1 * quiz2)  1      3.282 315.09 126.97
## - I(quiz1 * quiz3)  1      5.854 324.23 127.06
## - quiz1             1      7.333 325.70 127.71
## + quiz3             1      1.290 317.08 127.87
## + quiz2             1      0.375 318.00 128.28
## + I(quiz1^2)        1      0.001 318.37 128.45
## - I(quiz2 * quiz3)  1     14.237 332.61 130.71
## - I(quiz2^2)        1     16.984 335.36 131.89
## - I(quiz3^2)        1     49.877 368.25 145.27
```

```
step2$anova
```

```
## Stepwise Model Path
## Analysis of Deviance Table
##
## Initial Model:
## quiz4 ~ quiz1 + quiz2 + quiz3 + I(quiz1^2) + I(quiz2^2) + I(quiz3^2) +
## I(quiz1 * quiz2) + I(quiz1 * quiz3) + I(quiz2 * quiz3)
##
## Final Model:
## quiz4 ~ quiz1 + I(quiz2^2) + I(quiz3^2) + I(quiz1 * quiz3) +
## I(quiz2 * quiz3)
##
##
##           Step Df  Deviance Resid. Df Resid. Dev    AIC
## 1              133   313.4994 132.2483
## 2      - quiz2   1  0.1837979   134   313.6832 130.3321
## 3      - quiz3   1  0.5284344   135   314.2117 128.5728
## 4      - I(quiz1^2) 1  0.8777931   136   315.0894 126.9717
## 5 - I(quiz1 * quiz2) 1  3.2824396   137   318.3719 126.4537
```



```
study_hours.fit = lm(quiz4 ~ study1 + study2 + study3 + study4)
step3 = stepAIC(study_hours.fit, direction = "both")
```

```
## Start:  AIC=185.72
## quiz4 ~ study1 + study2 + study3 + study4
##
##           Df Sum of Sq  RSS   AIC
## - study1  1    0.0036 488.66 183.72
## - study3  1    0.0637 488.72 183.74
## - study2  1    1.6373 490.30 184.20
## - study4  1    1.9053 490.56 184.28
## <none>                        488.66 185.72
##
## Step:  AIC=183.72
## quiz4 ~ study2 + study3 + study4
##
##           Df Sum of Sq  RSS   AIC
## - study3  1    0.06026 488.72 181.74
## - study4  1    1.91222 490.57 182.28
## - study2  1    1.94882 490.61 182.29
## <none>                        488.66 183.72
## + study1  1    0.00360 488.66 185.72
##
## Step:  AIC=181.74
## quiz4 ~ study2 + study4
##
##           Df Sum of Sq  RSS   AIC
## - study4  1    2.02502 490.75 180.33
## - study2  1    2.35460 491.08 180.43
## <none>                        488.72 181.74
## + study3  1    0.06026 488.66 183.72
## + study1  1    0.00016 488.72 183.74
##
## Step:  AIC=180.33
## quiz4 ~ study2
##
##           Df Sum of Sq  RSS   AIC
## - study2  1    6.6092 497.36 180.24
## <none>                        490.75 180.33
## + study4  1    2.0250 488.72 181.74
## + study3  1    0.1731 490.57 182.28
## + study1  1    0.0001 490.75 182.33
##
## Step:  AIC=180.24
## quiz4 ~ 1
##
##           Df Sum of Sq  RSS   AIC
## <none>                        497.36 180.24
## + study2  1    6.6092 490.75 180.33
## + study4  1    6.2796 491.08 180.43
## + study3  1    4.3868 492.97 180.98
## + study1  1    2.4617 494.89 181.53
```

```
step3$anova
```

```
## Stepwise Model Path
## Analysis of Deviance Table
##
## Initial Model:
## quiz4 ~ study1 + study2 + study3 + study4
##
## Final Model:
## quiz4 ~ 1
##
##
```

	Step	Df	Deviance	Resid. Df	Resid. Dev	AIC
## 1				138	488.6586	185.7212
## 2 - study1	1	0.003600637		139	488.6622	183.7222
## 3 - study3	1	0.060258056		140	488.7224	181.7399
## 4 - study4	1	2.025023377		141	490.7474	180.3312
## 5 - study2	1	6.609208118		142	497.3566	180.2442

```

study_hours.fit2 = lm(
  quiz4 ~ study1 + study2 + study3 + study4 +
    I(study1 ^ 2) + I(study2 ^ 2) + I(study3 ^ 2) + I(study4 ^ 2) +
    I(study1 * study2) + I(study1 * study3) + I(study1 * study4) +
    I(study2 * study3) + I(study2 * study4) + I(study3 * study4))
step4 = stepAIC(study_hours.fit2, direction = "both")

## Start:  AIC=199.22
## quiz4 ~ study1 + study2 + study3 + study4 + I(study1^2) + I(study2^2) +
##      I(study3^2) + I(study4^2) + I(study1 * study2) + I(study1 *
##      study3) + I(study1 * study4) + I(study2 * study3) + I(study2 *
##      study4) + I(study3 * study4)
##
##
##      Df Sum of Sq    RSS    AIC
## - study3      1    0.0043 466.95 197.22
## - I(study3^2)    1    0.0580 467.00 197.24
## - study4      1    0.0781 467.02 197.25
## - I(study3 * study4) 1    0.2485 467.19 197.30
## - I(study1 * study2) 1    2.0389 468.98 197.84
## - I(study4^2)    1    3.0960 470.04 198.17
## - study1      1    3.3162 470.26 198.23
## - I(study1^2)    1    3.7952 470.74 198.38
## - I(study2 * study3) 1    3.9899 470.93 198.44
## - I(study2 * study4) 1    4.7652 471.71 198.67
## - I(study1 * study4) 1    5.4567 472.40 198.88
## <none>                      466.94 199.22
## - I(study1 * study3) 1    6.7978 473.74 199.29
## - study2      1    7.1961 474.14 199.41
## - I(study2^2)    1    9.4827 476.43 200.10
##
## Step:  AIC=197.22
## quiz4 ~ study1 + study2 + study4 + I(study1^2) + I(study2^2) +
##      I(study3^2) + I(study4^2) + I(study1 * study2) + I(study1 *
##      study3) + I(study1 * study4) + I(study2 * study3) + I(study2 *
##      study4) + I(study3 * study4)
##
##
##      Df Sum of Sq    RSS    AIC
## - I(study3^2)    1    0.0734 467.02 195.25
## - study4      1    0.1275 467.07 195.26
## - I(study3 * study4) 1    0.2485 467.20 195.30
## - I(study1 * study2) 1    2.0602 469.01 195.85
## - I(study4^2)    1    3.0960 470.04 196.17
## - study1      1    3.3136 470.26 196.23
## - I(study1^2)    1    3.7926 470.74 196.38
## - I(study2 * study3) 1    4.4214 471.37 196.57
## - I(study2 * study4) 1    5.4534 472.40 196.88
## - I(study1 * study4) 1    5.5569 472.50 196.91
## <none>                      466.95 197.22
## - I(study1 * study3) 1    7.0448 473.99 197.36
## - study2      1    8.1384 475.09 197.69
## - I(study2^2)    1    9.8824 476.83 198.22
## + study3      1    0.0043 466.94 199.22
##

```

```

## Step: AIC=195.24
## quiz4 ~ study1 + study2 + study4 + I(study1^2) + I(study2^2) +
##      I(study4^2) + I(study1 * study2) + I(study1 * study3) + I(study1 *
##      study4) + I(study2 * study3) + I(study2 * study4) + I(study3 *
##      study4)
##
##
##      Df Sum of Sq    RSS    AIC
## - I(study3 * study4)  1    0.1913 467.21 193.30
## - study4              1    0.2019 467.22 193.31
## - I(study1 * study2)  1    2.0561 469.08 193.87
## - I(study4^2)         1    3.1124 470.13 194.19
## - study1              1    3.4808 470.50 194.31
## - I(study1^2)         1    3.7290 470.75 194.38
## - I(study2 * study3)  1    5.5148 472.54 194.92
## - I(study1 * study4)  1    6.0548 473.08 195.09
## <none>                467.02 195.25
## - I(study2 * study4)  1    7.1626 474.18 195.42
## - I(study1 * study3)  1    7.9236 474.94 195.65
## - study2              1    8.0705 475.09 195.69
## - I(study2^2)         1   10.0696 477.09 196.29
## + I(study3^2)         1    0.0734 466.95 197.22
## + study3              1    0.0196 467.00 197.24
##
## Step: AIC=193.3
## quiz4 ~ study1 + study2 + study4 + I(study1^2) + I(study2^2) +
##      I(study4^2) + I(study1 * study2) + I(study1 * study3) + I(study1 *
##      study4) + I(study2 * study3) + I(study2 * study4)
##
##
##      Df Sum of Sq    RSS    AIC
## - study4              1    0.2295 467.44 191.37
## - I(study1 * study2)  1    3.0352 470.25 192.23
## - I(study4^2)         1    3.1916 470.40 192.28
## - I(study1^2)         1    3.6019 470.81 192.40
## - study1              1    4.1302 471.34 192.56
## - I(study1 * study4)  1    6.5001 473.71 193.28
## <none>                467.21 193.30
## - I(study2 * study3)  1    6.9504 474.16 193.41
## - I(study2 * study4)  1    7.3248 474.54 193.53
## - I(study1 * study3)  1    7.7466 474.96 193.66
## - study2              1    9.1287 476.34 194.07
## - I(study2^2)         1    9.9002 477.11 194.30
## + I(study3 * study4)  1    0.1913 467.02 195.25
## + I(study3^2)         1    0.0161 467.20 195.30
## + study3              1    0.0001 467.21 195.30
##
## Step: AIC=191.37
## quiz4 ~ study1 + study2 + I(study1^2) + I(study2^2) + I(study4^2) +
##      I(study1 * study2) + I(study1 * study3) + I(study1 * study4) +
##      I(study2 * study3) + I(study2 * study4)
##
##
##      Df Sum of Sq    RSS    AIC
## - I(study1 * study2)  1    2.9235 470.37 190.26
## - I(study1^2)         1    3.4661 470.91 190.43
## - study1              1    4.1443 471.59 190.64

```

```

## - I(study4^2)      1      4.8433 472.28 190.85
## <none>              467.44 191.37
## - I(study2 * study3) 1      7.0024 474.44 191.50
## - I(study2 * study4) 1      7.8460 475.29 191.75
## - I(study1 * study3) 1      7.8817 475.32 191.76
## - I(study1 * study4) 1      8.2982 475.74 191.89
## - study2           1      9.4396 476.88 192.23
## - I(study2^2)       1      9.9303 477.37 192.38
## + study4           1      0.2295 467.21 193.30
## + I(study3 * study4) 1      0.2189 467.22 193.31
## + study3           1      0.0647 467.38 193.35
## + I(study3^2)       1      0.0028 467.44 193.37
##
## Step:  AIC=190.27
## quiz4 ~ study1 + study2 + I(study1^2) + I(study2^2) + I(study4^2) +
##      I(study1 * study3) + I(study1 * study4) + I(study2 * study3) +
##      I(study2 * study4)
##
##
##      Df Sum of Sq    RSS    AIC
## - study1      1      2.2404 472.61 188.94
## - I(study4^2)  1      4.1963 474.56 189.53
## - I(study2 * study3) 1      6.0504 476.42 190.09
## - I(study1^2)  1      6.3262 476.69 190.18
## - I(study1 * study3) 1      6.4706 476.84 190.22
## <none>              470.37 190.26
## - I(study2^2)  1      7.6017 477.97 190.56
## - study2       1      7.7768 478.14 190.61
## - I(study2 * study4) 1      8.4265 478.79 190.80
## + I(study1 * study2) 1      2.9235 467.44 191.37
## - I(study1 * study4) 1     11.0313 481.40 191.58
## + I(study3 * study4) 1      1.2474 469.12 191.88
## + I(study3^2)  1      0.5025 469.86 192.11
## + study3       1      0.3291 470.04 192.16
## + study4       1      0.1178 470.25 192.23
##
## Step:  AIC=188.94
## quiz4 ~ study2 + I(study1^2) + I(study2^2) + I(study4^2) + I(study1 *
##      study3) + I(study1 * study4) + I(study2 * study3) + I(study2 *
##      study4)
##
##
##      Df Sum of Sq    RSS    AIC
## - I(study4^2)  1      3.8959 476.50 188.12
## - I(study1^2)  1      4.6217 477.23 188.34
## - study2       1      5.6411 478.25 188.64
## - I(study2^2)  1      5.8772 478.48 188.71
## <none>              472.61 188.94
## - I(study2 * study4) 1      7.8520 480.46 189.30
## - I(study2 * study3) 1      9.0008 481.61 189.64
## - I(study1 * study3) 1     10.1477 482.75 189.98
## - I(study1 * study4) 1     10.6317 483.24 190.13
## + study1       1      2.2404 470.37 190.26
## + I(study3 * study4) 1      1.5114 471.09 190.49
## + I(study1 * study2) 1      1.0197 471.59 190.64
## + study4       1      0.5828 472.02 190.77

```

```

## + I(study3^2)          1    0.5490 472.06 190.78
## + study3              1    0.5215 472.08 190.79
##
## Step:  AIC=188.12
## quiz4 ~ study2 + I(study1^2) + I(study2^2) + I(study1 * study3) +
##      I(study1 * study4) + I(study2 * study3) + I(study2 * study4)
##
##              Df Sum of Sq    RSS    AIC
## - I(study1^2)    1    3.1156 479.62 187.05
## - I(study2 * study4) 1    4.3267 480.83 187.41
## - study2         1    5.3713 481.87 187.72
## - I(study2 * study3) 1    5.5916 482.09 187.79
## <none>                                476.50 188.12
## - I(study1 * study3) 1    7.1820 483.68 188.26
## - I(study1 * study4) 1    7.4768 483.98 188.34
## - I(study2^2)     1    7.4936 484.00 188.35
## + I(study4^2)     1    3.8959 472.61 188.94
## + study1          1    1.9400 474.56 189.53
## + I(study1 * study2) 1    0.7629 475.74 189.89
## + study3          1    0.0553 476.45 190.10
## + I(study3^2)     1    0.0506 476.45 190.10
## + study4          1    0.0176 476.48 190.11
## + I(study3 * study4) 1    0.0012 476.50 190.12
##
## Step:  AIC=187.05
## quiz4 ~ study2 + I(study2^2) + I(study1 * study3) + I(study1 *
##      study4) + I(study2 * study3) + I(study2 * study4)
##
##              Df Sum of Sq    RSS    AIC
## - I(study2 * study3) 1    2.4768 482.09 185.79
## - I(study2 * study4) 1    2.9103 482.53 185.92
## - I(study1 * study3) 1    4.6390 484.26 186.43
## - I(study2^2)     1    5.2348 484.85 186.60
## - I(study1 * study4) 1    5.8449 485.46 186.78
## - study2         1    6.5837 486.20 187.00
## <none>                                479.62 187.05
## + I(study1^2)     1    3.1156 476.50 188.12
## + I(study4^2)     1    2.3899 477.23 188.34
## + I(study1 * study2) 1    2.3790 477.24 188.34
## + study1          1    0.5829 479.03 188.88
## + study3          1    0.4399 479.18 188.92
## + I(study3^2)     1    0.4357 479.18 188.92
## + study4          1    0.0629 479.55 189.03
## + I(study3 * study4) 1    0.0607 479.56 189.03
##
## Step:  AIC=185.79
## quiz4 ~ study2 + I(study2^2) + I(study1 * study3) + I(study1 *
##      study4) + I(study2 * study4)
##
##              Df Sum of Sq    RSS    AIC
## - I(study2 * study4) 1    0.6104 482.70 183.97
## - I(study1 * study3) 1    2.2326 484.33 184.45
## - I(study1 * study4) 1    3.3696 485.46 184.78
## - I(study2^2)     1    3.5236 485.62 184.83

```

```

## - study2          1      6.4950 488.59 185.70
## <none>              482.09 185.79
## + study1          1      2.5529 479.54 187.03
## + I(study2 * study3) 1      2.4768 479.62 187.05
## + I(study3^2)      1      0.8832 481.21 187.53
## + I(study3 * study4) 1      0.6747 481.42 187.59
## + I(study4^2)      1      0.4758 481.62 187.65
## + study3          1      0.4660 481.63 187.65
## + study4          1      0.1521 481.94 187.74
## + I(study1 * study2) 1      0.0754 482.02 187.76
## + I(study1^2)      1      0.0008 482.09 187.79
##
## Step:  AIC=183.97
## quiz4 ~ study2 + I(study2^2) + I(study1 * study3) + I(study1 *
##      study4)
##
##              Df Sum of Sq    RSS    AIC
## - I(study1 * study3)  1      1.6862 484.39 182.47
## - I(study2^2)        1      3.9262 486.63 183.13
## - I(study1 * study4)  1      4.2868 486.99 183.23
## - study2             1      5.9302 488.63 183.71
## <none>                482.70 183.97
## + study4             1      0.7621 481.94 185.74
## + study1             1      0.6903 482.01 185.76
## + I(study2 * study4)  1      0.6104 482.09 185.79
## + I(study1 * study2)  1      0.5160 482.19 185.81
## + I(study1^2)        1      0.1878 482.52 185.91
## + I(study2 * study3)  1      0.1769 482.53 185.92
## + I(study3 * study4)  1      0.0702 482.63 185.95
## + I(study4^2)        1      0.0639 482.64 185.95
## + I(study3^2)        1      0.0166 482.69 185.96
## + study3             1      0.0004 482.70 185.97
##
## Step:  AIC=182.47
## quiz4 ~ study2 + I(study2^2) + I(study1 * study4)
##
##              Df Sum of Sq    RSS    AIC
## - I(study1 * study4)  1      3.0242 487.41 181.36
## - I(study2^2)        1      4.6574 489.05 181.84
## - study2             1      5.9712 490.36 182.22
## <none>                484.39 182.47
## + study1             1      2.2894 482.10 183.79
## + I(study1 * study3)  1      1.6862 482.70 183.97
## + I(study1^2)        1      0.4872 483.90 184.32
## + I(study4^2)        1      0.3954 484.00 184.35
## + study3             1      0.3305 484.06 184.37
## + I(study1 * study2)  1      0.2826 484.11 184.38
## + I(study3^2)        1      0.1803 484.21 184.41
## + I(study2 * study4)  1      0.0640 484.33 184.45
## + study4             1      0.0617 484.33 184.45
## + I(study3 * study4)  1      0.0430 484.35 184.45
## + I(study2 * study3)  1      0.0401 484.35 184.46
##
## Step:  AIC=181.36

```

```
## quiz4 ~ study2 + I(study2^2)
##
##
##      Df Sum of Sq    RSS    AIC
## - I(study2^2)      1      3.3327 490.75 180.33
## - study2           1      6.0315 493.45 181.12
## <none>                                487.41 181.36
## + I(study1 * study4) 1      3.0242 484.39 182.47
## + I(study4^2)        1      2.1451 485.27 182.73
## + I(study2 * study4) 1      1.8658 485.55 182.81
## + I(study3 * study4) 1      1.8580 485.56 182.81
## + study4            1      1.7089 485.71 182.85
## + I(study1 * study2) 1      0.7926 486.62 183.12
## + I(study2 * study3) 1      0.7777 486.64 183.13
## + I(study1^2)        1      0.5191 486.90 183.20
## + I(study1 * study3) 1      0.4235 486.99 183.23
## + I(study3^2)        1      0.3141 487.10 183.26
## + study3            1      0.1373 487.28 183.32
## + study1            1      0.0008 487.41 183.36
##
## Step:  AIC=180.33
## quiz4 ~ study2
##
##      Df Sum of Sq    RSS    AIC
## - study2           1      6.6092 497.36 180.24
## <none>                                490.75 180.33
## + I(study2^2)      1      3.3327 487.41 181.36
## + I(study4^2)      1      2.2785 488.47 181.67
## + study4           1      2.0250 488.72 181.74
## + I(study1 * study4) 1      1.6994 489.05 181.84
## + I(study3 * study4) 1      1.4352 489.31 181.91
## + I(study2 * study4) 1      1.1387 489.61 182.00
## + study3           1      0.1731 490.57 182.28
## + I(study1^2)      1      0.1345 490.61 182.29
## + I(study3^2)      1      0.0774 490.67 182.31
## + I(study1 * study3) 1      0.0330 490.71 182.32
## + I(study1 * study2) 1      0.0165 490.73 182.33
## + I(study2 * study3) 1      0.0151 490.73 182.33
## + study1           1      0.0001 490.75 182.33
##
## Step:  AIC=180.24
## quiz4 ~ 1
##
##      Df Sum of Sq    RSS    AIC
## <none>                                497.36 180.24
## + I(study1 * study4) 1      6.8450 490.51 180.26
## + I(study2 * study4) 1      6.7305 490.63 180.30
## + study2            1      6.6092 490.75 180.33
## + study4            1      6.2796 491.08 180.43
## + I(study3 * study4) 1      5.9565 491.40 180.52
## + I(study2 * study3) 1      5.2733 492.08 180.72
## + I(study4^2)      1      5.0114 492.35 180.80
## + study3            1      4.3868 492.97 180.98
## + I(study1 * study2) 1      4.3408 493.02 180.99
## + I(study2^2)      1      3.9104 493.45 181.12
```



```
## + I(study1 * study3) 1      3.3573 494.00 181.28
## + I(study3^2)         1      3.2663 494.09 181.30
## + I(study1^2)         1      2.6994 494.66 181.47
## + study1              1      2.4617 494.89 181.53
```

```
step4$anova
```

```
## Stepwise Model Path
## Analysis of Deviance Table
##
## Initial Model:
## quiz4 ~ study1 + study2 + study3 + study4 + I(study1^2) + I(study2^2) +
##      I(study3^2) + I(study4^2) + I(study1 * study2) + I(study1 *
##      study3) + I(study1 * study4) + I(study2 * study3) + I(study2 *
##      study4) + I(study3 * study4)
##
## Final Model:
## quiz4 ~ 1
##
##
##
```

		Step	Df	Deviance	Resid. Df	Resid. Dev	AIC
##	1				128	466.9431	199.2209
##	2	- study3	1	0.00430495	129	466.9475	197.2222
##	3	- I(study3^2)	1	0.07336764	130	467.0208	195.2447
##	4	- I(study3 * study4)	1	0.19129771	131	467.2121	193.3032
##	5	- study4	1	0.22949939	132	467.4416	191.3735
##	6	- I(study1 * study2)	1	2.92352932	133	470.3651	190.2650
##	7	- study1	1	2.24044009	134	472.6056	188.9446
##	8	- I(study4^2)	1	3.89593331	135	476.5015	188.1186
##	9	- I(study1^2)	1	3.11561943	136	479.6171	187.0505
##	10	- I(study2 * study3)	1	2.47680893	137	482.0939	185.7871
##	11	- I(study2 * study4)	1	0.61042941	138	482.7044	183.9680
##	12	- I(study1 * study3)	1	1.68622607	139	484.3906	182.4667
##	13	- I(study1 * study4)	1	3.02415660	140	487.4148	181.3567
##	14	- I(study2^2)	1	3.33267711	141	490.7474	180.3312
##	15	- study2	1	6.60920812	142	497.3566	180.2442

```
covid_hours.fit = lm(quiz4 ~ covid1 + covid2 + covid3 + covid4)
step5 = stepAIC(covid_hours.fit, direction = "both")
```

```
## Start: AIC=185.84
## quiz4 ~ covid1 + covid2 + covid3 + covid4
##
##      Df Sum of Sq  RSS   AIC
## - covid3  1    1.0823 490.16 184.16
## - covid2  1    2.3491 491.42 184.53
## - covid1  1    3.7356 492.81 184.93
## - covid4  1    4.3504 493.42 185.11
## <none>                 489.07 185.84
##
## Step: AIC=184.16
## quiz4 ~ covid1 + covid2 + covid4
##
##      Df Sum of Sq  RSS   AIC
## - covid4  1    3.2694 493.43 183.11
## - covid1  1    3.8322 493.99 183.27
## <none>                 490.16 184.16
## - covid2  1    7.1296 497.29 184.22
## + covid3  1    1.0823 489.07 185.84
##
## Step: AIC=183.11
## quiz4 ~ covid1 + covid2
##
##      Df Sum of Sq  RSS   AIC
## - covid1  1    2.1299 495.56 181.72
## - covid2  1    3.8838 497.31 182.23
## <none>                 493.43 183.11
## + covid4  1    3.2694 490.16 184.16
## + covid3  1    0.0013 493.42 185.11
##
## Step: AIC=181.73
## quiz4 ~ covid2
##
##      Df Sum of Sq  RSS   AIC
## - covid2  1    1.80115 497.36 180.24
## <none>                 495.56 181.72
## + covid1  1    2.12988 493.43 183.11
## + covid4  1    1.56702 493.99 183.27
## + covid3  1    0.08923 495.47 183.70
##
## Step: AIC=180.24
## quiz4 ~ 1
##
##      Df Sum of Sq  RSS   AIC
## <none>                 497.36 180.24
## + covid2  1    1.80115 495.56 181.72
## + covid3  1    1.62208 495.73 181.78
## + covid1  1    0.04724 497.31 182.23
## + covid4  1    0.03785 497.32 182.23
```

```
step5$anova
```

```
## Stepwise Model Path
## Analysis of Deviance Table
##
## Initial Model:
## quiz4 ~ covid1 + covid2 + covid3 + covid4
##
## Final Model:
## quiz4 ~ 1
##
##
```

##	Step	Df	Deviance	Resid. Df	Resid. Dev	AIC
##	1			138	489.0739	185.8427
##	2 - covid3	1	1.082314	139	490.1562	184.1588
##	3 - covid4	1	3.269375	140	493.4256	183.1094
##	4 - covid1	1	2.129878	141	495.5555	181.7254
##	5 - covid2	1	1.801145	142	497.3566	180.2442

```
covid_hours.fit2 = lm(
  quiz4 ~ covid1 + covid2 + covid3 + covid4 +
    I(covid1 ^ 2) + I(covid2 ^ 2) + I(covid3 ^ 2) + I(covid4 ^ 2) +
    I(covid1 * covid2) + I(covid1 * covid3) + I(covid1 * covid4) +
    I(covid2 * covid3) + I(covid2 * covid4) + I(covid3 * covid4))
step6 = stepAIC(covid_hours.fit2, direction = "both")

## Start:  AIC=200.33
## quiz4 ~ covid1 + covid2 + covid3 + covid4 + I(covid1^2) + I(covid2^2) +
##   I(covid3^2) + I(covid4^2) + I(covid1 * covid2) + I(covid1 *
##   covid3) + I(covid1 * covid4) + I(covid2 * covid3) + I(covid2 *
##   covid4) + I(covid3 * covid4)
##
##
##      Df Sum of Sq  RSS   AIC
## - I(covid2^2)      1    0.0276 470.61 198.34
## - I(covid2 * covid3) 1    0.2027 470.78 198.39
## - I(covid1 * covid4) 1    0.3376 470.92 198.43
## - I(covid1^2)      1    0.4076 470.99 198.45
## - covid4          1    1.1075 471.69 198.67
## - I(covid3^2)      1    1.1233 471.70 198.67
## - covid1          1    1.4287 472.01 198.76
## - I(covid1 * covid2) 1    1.6520 472.23 198.83
## - covid2          1    1.7547 472.33 198.86
## - I(covid4^2)      1    2.0298 472.61 198.95
## - I(covid3 * covid4) 1    2.2247 472.80 199.00
## - covid3          1    2.4074 472.99 199.06
## - I(covid1 * covid3) 1    2.7265 473.31 199.16
## - I(covid2 * covid4) 1    3.3488 473.93 199.34
## <none>                     470.58 200.33
##
## Step:  AIC=198.34
## quiz4 ~ covid1 + covid2 + covid3 + covid4 + I(covid1^2) + I(covid3^2) +
##   I(covid4^2) + I(covid1 * covid2) + I(covid1 * covid3) + I(covid1 *
##   covid4) + I(covid2 * covid3) + I(covid2 * covid4) + I(covid3 *
##   covid4)
##
##
##      Df Sum of Sq  RSS   AIC
## - I(covid1^2)      1    0.4149 471.02 196.47
## - I(covid1 * covid4) 1    0.4447 471.05 196.47
## - covid4          1    1.1736 471.78 196.69
## - covid1          1    1.5366 472.14 196.81
## - I(covid1 * covid2) 1    1.6799 472.29 196.85
## - covid2          1    1.7272 472.33 196.86
## - I(covid4^2)      1    2.8571 473.46 197.20
## - I(covid1 * covid3) 1    2.9947 473.60 197.25
## - I(covid2 * covid3) 1    3.1094 473.72 197.28
## - I(covid2 * covid4) 1    3.3915 474.00 197.37
## - I(covid3 * covid4) 1    3.4371 474.04 197.38
## - I(covid3^2)      1    3.7357 474.34 197.47
## - covid3          1    4.1604 474.77 197.60
## <none>                     470.61 198.34
## + I(covid2^2)      1    0.0276 470.58 200.33
##
```

```

## Step: AIC=196.46
## quiz4 ~ covid1 + covid2 + covid3 + covid4 + I(covid3^2) + I(covid4^2) +
##      I(covid1 * covid2) + I(covid1 * covid3) + I(covid1 * covid4) +
##      I(covid2 * covid3) + I(covid2 * covid4) + I(covid3 * covid4)
##
##
##      Df Sum of Sq  RSS   AIC
## - I(covid1 * covid4)  1    0.7082 471.73 194.68
## - covid4              1    1.2211 472.24 194.84
## - covid2              1    1.3337 472.36 194.87
## - covid1              1    2.1659 473.19 195.12
## - I(covid1 * covid2)  1    2.2507 473.27 195.15
## - I(covid1 * covid3)  1    2.6259 473.65 195.26
## - I(covid2 * covid3)  1    2.7521 473.77 195.30
## - I(covid3 * covid4)  1    3.1584 474.18 195.42
## - I(covid3^2)         1    3.4665 474.49 195.51
## - I(covid2 * covid4)  1    3.5018 474.52 195.52
## - covid3              1    3.9453 474.97 195.66
## - I(covid4^2)         1    4.0654 475.09 195.69
## <none>                471.02 196.47
## + I(covid1^2)         1    0.4149 470.61 198.34
## + I(covid2^2)         1    0.0350 470.99 198.45
##
## Step: AIC=194.68
## quiz4 ~ covid1 + covid2 + covid3 + covid4 + I(covid3^2) + I(covid4^2) +
##      I(covid1 * covid2) + I(covid1 * covid3) + I(covid2 * covid3) +
##      I(covid2 * covid4) + I(covid3 * covid4)
##
##
##      Df Sum of Sq  RSS   AIC
## - covid2              1    1.1317 472.86 193.02
## - I(covid1 * covid2)  1    1.5442 473.27 193.15
## - covid1              1    1.9970 473.73 193.28
## - I(covid1 * covid3)  1    2.0395 473.77 193.30
## - covid4              1    2.3932 474.12 193.40
## - I(covid2 * covid3)  1    2.5142 474.24 193.44
## - I(covid3 * covid4)  1    2.5572 474.29 193.45
## - I(covid2 * covid4)  1    2.9624 474.69 193.57
## - I(covid4^2)         1    3.4358 475.17 193.72
## - I(covid3^2)         1    3.5807 475.31 193.76
## - covid3              1    3.6622 475.39 193.78
## <none>                471.73 194.68
## + I(covid1 * covid4)  1    0.7082 471.02 196.47
## + I(covid1^2)         1    0.6784 471.05 196.47
## + I(covid2^2)         1    0.0020 471.73 196.68
##
## Step: AIC=193.02
## quiz4 ~ covid1 + covid3 + covid4 + I(covid3^2) + I(covid4^2) +
##      I(covid1 * covid2) + I(covid1 * covid3) + I(covid2 * covid3) +
##      I(covid2 * covid4) + I(covid3 * covid4)
##
##
##      Df Sum of Sq  RSS   AIC
## - covid1              1    1.0529 473.91 191.34
## - I(covid1 * covid2)  1    1.2205 474.08 191.39
## - I(covid1 * covid3)  1    1.4587 474.32 191.46
## - covid4              1    1.7064 474.57 191.54

```

```

## - I(covid2 * covid3) 1 2.4127 475.27 191.75
## - I(covid3^2) 1 2.4842 475.35 191.77
## - covid3 1 2.5680 475.43 191.80
## - I(covid2 * covid4) 1 2.7747 475.64 191.86
## - I(covid3 * covid4) 1 3.1907 476.05 191.98
## - I(covid4^2) 1 3.6546 476.52 192.12
## <none> 472.86 193.02
## + covid2 1 1.1317 471.73 194.68
## + I(covid1 * covid4) 1 0.5062 472.36 194.87
## + I(covid1^2) 1 0.1067 472.76 194.99
## + I(covid2^2) 1 0.0022 472.86 195.02
##
## Step: AIC=191.34
## quiz4 ~ covid3 + covid4 + I(covid3^2) + I(covid4^2) + I(covid1 *
## covid2) + I(covid1 * covid3) + I(covid2 * covid3) + I(covid2 *
## covid4) + I(covid3 * covid4)
##
## Df Sum of Sq RSS AIC
## - I(covid1 * covid2) 1 0.4009 474.32 189.46
## - I(covid1 * covid3) 1 0.4942 474.41 189.49
## - covid4 1 1.4685 475.38 189.78
## - I(covid2 * covid4) 1 2.4460 476.36 190.08
## - I(covid3 * covid4) 1 2.9138 476.83 190.22
## - I(covid2 * covid3) 1 2.9450 476.86 190.23
## - I(covid4^2) 1 3.2142 477.13 190.31
## - covid3 1 3.3365 477.25 190.34
## - I(covid3^2) 1 4.8984 478.81 190.81
## <none> 473.91 191.34
## + covid1 1 1.0529 472.86 193.02
## + I(covid1^2) 1 0.5589 473.36 193.17
## + I(covid1 * covid4) 1 0.4777 473.44 193.20
## + covid2 1 0.1876 473.73 193.28
## + I(covid2^2) 1 0.0001 473.91 193.34
##
## Step: AIC=189.46
## quiz4 ~ covid3 + covid4 + I(covid3^2) + I(covid4^2) + I(covid1 *
## covid3) + I(covid2 * covid3) + I(covid2 * covid4) + I(covid3 *
## covid4)
##
## Df Sum of Sq RSS AIC
## - covid4 1 1.0884 475.40 187.79
## - I(covid2 * covid4) 1 2.1863 476.50 188.12
## - I(covid3 * covid4) 1 2.6044 476.92 188.24
## - I(covid4^2) 1 2.8244 477.14 188.31
## - covid3 1 2.9692 477.28 188.35
## - I(covid1 * covid3) 1 2.9781 477.29 188.36
## - I(covid2 * covid3) 1 4.0850 478.40 188.69
## - I(covid3^2) 1 5.9960 480.31 189.26
## <none> 474.32 189.46
## + I(covid1 * covid2) 1 0.4009 473.91 191.34
## + covid2 1 0.2931 474.02 191.37
## + covid1 1 0.2332 474.08 191.39
## + I(covid1^2) 1 0.1013 474.21 191.43
## + I(covid2^2) 1 0.0505 474.27 191.45

```

```

## + I(covid1 * covid4) 1 0.0146 474.30 191.46
##
## Step: AIC=187.79
## quiz4 ~ covid3 + I(covid3^2) + I(covid4^2) + I(covid1 * covid3) +
## I(covid2 * covid3) + I(covid2 * covid4) + I(covid3 * covid4)
##
## Df Sum of Sq RSS AIC
## - I(covid2 * covid4) 1 1.4369 476.84 186.22
## - I(covid3 * covid4) 1 2.1953 477.60 186.45
## - I(covid4^2) 1 2.2332 477.64 186.46
## - I(covid1 * covid3) 1 2.6657 478.07 186.59
## - I(covid2 * covid3) 1 3.3369 478.74 186.79
## <none> 475.40 187.79
## - I(covid3^2) 1 7.3341 482.74 187.98
## - covid3 1 8.2056 483.61 188.24
## + covid4 1 1.0884 474.32 189.46
## + I(covid1 * covid4) 1 0.4756 474.93 189.65
## + covid1 1 0.4244 474.98 189.66
## + I(covid2^2) 1 0.1118 475.29 189.75
## + covid2 1 0.0474 475.36 189.78
## + I(covid1^2) 1 0.0309 475.37 189.78
## + I(covid1 * covid2) 1 0.0207 475.38 189.78
##
## Step: AIC=186.22
## quiz4 ~ covid3 + I(covid3^2) + I(covid4^2) + I(covid1 * covid3) +
## I(covid2 * covid3) + I(covid3 * covid4)
##
## Df Sum of Sq RSS AIC
## - I(covid3 * covid4) 1 0.7891 477.63 184.46
## - I(covid4^2) 1 1.2363 478.08 184.59
## - I(covid2 * covid3) 1 1.9689 478.81 184.81
## - I(covid1 * covid3) 1 3.7684 480.61 185.35
## - I(covid3^2) 1 6.3090 483.15 186.10
## <none> 476.84 186.22
## - covid3 1 7.3520 484.19 186.41
## + I(covid2 * covid4) 1 1.4369 475.40 187.79
## + covid1 1 0.3447 476.50 188.12
## + covid4 1 0.3389 476.50 188.12
## + covid2 1 0.0945 476.75 188.19
## + I(covid1^2) 1 0.0667 476.77 188.20
## + I(covid1 * covid2) 1 0.0151 476.83 188.22
## + I(covid2^2) 1 0.0106 476.83 188.22
## + I(covid1 * covid4) 1 0.0040 476.84 188.22
##
## Step: AIC=184.46
## quiz4 ~ covid3 + I(covid3^2) + I(covid4^2) + I(covid1 * covid3) +
## I(covid2 * covid3)
##
## Df Sum of Sq RSS AIC
## - I(covid4^2) 1 2.4365 480.07 183.18
## - I(covid2 * covid3) 1 2.6957 480.33 183.26
## - I(covid1 * covid3) 1 3.2855 480.92 183.44
## - I(covid3^2) 1 5.6628 483.29 184.14
## <none> 477.63 184.46

```

```

## - covid3          1      7.8945 485.52 184.80
## + I(covid3 * covid4) 1      0.7891 476.84 186.22
## + I(covid2^2)       1      0.6064 477.02 186.28
## + covid4           1      0.5112 477.12 186.30
## + covid1           1      0.4373 477.19 186.33
## + covid2           1      0.2114 477.42 186.39
## + I(covid2 * covid4) 1      0.0306 477.60 186.45
## + I(covid1 * covid4) 1      0.0102 477.62 186.45
## + I(covid1^2)       1      0.0014 477.63 186.46
## + I(covid1 * covid2) 1      0.0006 477.63 186.46
##
## Step:  AIC=183.18
## quiz4 ~ covid3 + I(covid3^2) + I(covid1 * covid3) + I(covid2 *
##   covid3)
##
##              Df Sum of Sq    RSS    AIC
## - I(covid1 * covid3)  1      1.1782 481.24 181.53
## - I(covid2 * covid3)  1      1.2048 481.27 181.54
## <none>                  480.07 183.18
## + I(covid4^2)          1      2.4365 477.63 184.46
## + I(covid2 * covid4)  1      2.3430 477.72 184.49
## + I(covid3 * covid4)  1      1.9894 478.08 184.59
## - I(covid3^2)          1     12.2103 492.28 184.78
## + covid4              1      0.8565 479.21 184.93
## + I(covid1 * covid4)  1      0.6770 479.39 184.98
## + I(covid1 * covid2)  1      0.2357 479.83 185.11
## + I(covid2^2)          1      0.2073 479.86 185.12
## + I(covid1^2)          1      0.1848 479.88 185.13
## + covid2              1      0.1165 479.95 185.15
## + covid1              1      0.1005 479.97 185.16
## - covid3              1     14.7179 494.78 185.50
##
## Step:  AIC=181.53
## quiz4 ~ covid3 + I(covid3^2) + I(covid2 * covid3)
##
##              Df Sum of Sq    RSS    AIC
## - I(covid2 * covid3)  1      0.1604 481.41 179.58
## <none>                  481.24 181.53
## - I(covid3^2)          1     11.1348 492.38 182.81
## + I(covid1 * covid4)  1      1.4823 479.76 183.09
## + I(covid1^2)          1      1.2374 480.01 183.17
## + I(covid1 * covid2)  1      1.2153 480.03 183.17
## + I(covid1 * covid3)  1      1.1782 480.07 183.18
## + covid1              1      1.0049 480.24 183.24
## + covid2              1      0.8535 480.39 183.28
## + I(covid2 * covid4)  1      0.5554 480.69 183.37
## + I(covid4^2)          1      0.3292 480.92 183.44
## + I(covid3 * covid4)  1      0.2514 480.99 183.46
## + I(covid2^2)          1      0.1860 481.06 183.48
## + covid4              1      0.1075 481.14 183.50
## - covid3              1     15.6126 496.86 184.10
##
## Step:  AIC=179.58
## quiz4 ~ covid3 + I(covid3^2)

```



```
##
##              Df Sum of Sq    RSS    AIC
## <none>                481.41 179.58
## + covid2              1    0.5892 480.82 181.41
## + I(covid4^2)         1    0.4082 481.00 181.46
## + I(covid2 * covid4)  1    0.4004 481.00 181.46
## + I(covid3 * covid4)  1    0.2942 481.11 181.50
## + I(covid2^2)         1    0.2365 481.17 181.51
## + I(covid1 * covid4)  1    0.1810 481.22 181.53
## + I(covid2 * covid3)  1    0.1604 481.24 181.53
## + I(covid1^2)         1    0.1436 481.26 181.54
## + I(covid1 * covid3)  1    0.1338 481.27 181.54
## + I(covid1 * covid2)  1    0.1305 481.27 181.54
## + covid4              1    0.1210 481.28 181.55
## + covid1              1    0.1037 481.30 181.55
## - I(covid3^2)         1   14.3295 495.73 181.78
## - covid3              1   15.8929 497.30 182.23
```

```
step6$anova
```

```
## Stepwise Model Path
## Analysis of Deviance Table
##
## Initial Model:
## quiz4 ~ covid1 + covid2 + covid3 + covid4 + I(covid1^2) + I(covid2^2) +
##      I(covid3^2) + I(covid4^2) + I(covid1 * covid2) + I(covid1 *
##      covid3) + I(covid1 * covid4) + I(covid2 * covid3) + I(covid2 *
##      covid4) + I(covid3 * covid4)
##
## Final Model:
## quiz4 ~ covid3 + I(covid3^2)
##
##
##              Step Df    Deviance Resid. Df Resid. Dev    AIC
## 1                128   470.5793 200.3301
## 2      - I(covid2^2) 1  0.02764963   129   470.6070 198.3386
## 3      - I(covid1^2) 1  0.41492203   130   471.0219 196.4646
## 4 - I(covid1 * covid4) 1  0.70820596   131   471.7301 194.6794
## 5            - covid2 1  1.13173100   132   472.8618 193.0221
## 6            - covid1 1  1.05288470   133   473.9147 191.3401
## 7 - I(covid1 * covid2) 1  0.40085844   134   474.3156 189.4610
## 8            - covid4 1  1.08838760   135   475.4040 187.7888
## 9 - I(covid2 * covid4) 1  1.43686050   136   476.8408 186.2204
## 10 - I(covid3 * covid4) 1  0.78912216   137   477.6300 184.4568
## 11          - I(covid4^2) 1  2.43653205   138   480.0665 183.1844
## 12 - I(covid1 * covid3) 1  1.17819966   139   481.2447 181.5350
## 13 - I(covid2 * covid3) 1  0.16037496   140   481.4051 179.5826
```

```

full_model.fit = lm(quiz4 ~
  quiz1 + quiz2 + quiz3 +
  covid1 + covid2 + covid3 + covid4 +
  study1 + study2 + study3 + study4
)

step7 = stepAIC(full_model.fit, direction = "both")

## Start:  AIC=148.36
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
##      study1 + study2 + study3 + study4
##
##           Df Sum of Sq    RSS    AIC
## - covid2   1      0.001 341.22 146.37
## - covid1   1      0.027 341.25 146.38
## - covid3   1      0.027 341.25 146.38
## - quiz1    1      0.191 341.41 146.44
## - study2   1      0.372 341.59 146.52
## - covid4   1      0.382 341.60 146.53
## - quiz2    1      0.816 342.04 146.71
## - study1   1      3.656 344.88 147.89
## - study3   1      3.826 345.05 147.96
## - study4   1      3.915 345.14 148.00
## <none>                      341.22 148.37
## - quiz3    1    115.062 456.28 187.92
##
## Step:  AIC=146.37
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid3 + covid4 + study1 +
##      study2 + study3 + study4
##
##           Df Sum of Sq    RSS    AIC
## - covid1   1      0.049 341.27 144.39
## - covid3   1      0.050 341.27 144.39
## - quiz1    1      0.191 341.41 144.44
## - study2   1      0.372 341.59 144.52
## - covid4   1      0.388 341.61 144.53
## - quiz2    1      0.839 342.06 144.72
## - study1   1      3.669 344.89 145.89
## - study3   1      3.825 345.05 145.96
## - study4   1      4.129 345.35 146.09
## <none>                      341.22 146.37
## + covid2   1      0.001 341.22 148.37
## - quiz3    1    115.654 456.87 186.10
##
## Step:  AIC=144.39
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid3 + covid4 + study1 + study2 +
##      study3 + study4
##
##           Df Sum of Sq    RSS    AIC
## - covid3   1      0.143 341.41 142.45
## - quiz1    1      0.195 341.47 142.47
## - study2   1      0.355 341.63 142.53
## - covid4   1      0.476 341.75 142.59

```

```

## - quiz2 1 0.802 342.07 142.72
## - study1 1 3.738 345.01 143.94
## - study3 1 3.950 345.22 144.03
## - study4 1 4.250 345.52 144.16
## <none> 341.27 144.39
## + covid1 1 0.049 341.22 146.37
## + covid2 1 0.023 341.25 146.38
## - quiz3 1 116.027 457.30 184.24
##
## Step: AIC=142.45
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid4 + study1 + study2 + study3 +
## study4
##
## Df Sum of Sq RSS AIC
## - quiz1 1 0.152 341.57 140.51
## - study2 1 0.358 341.77 140.60
## - covid4 1 0.361 341.77 140.60
## - quiz2 1 0.848 342.26 140.80
## - study1 1 3.751 345.16 142.01
## - study3 1 3.918 345.33 142.08
## - study4 1 4.385 345.80 142.27
## <none> 341.41 142.45
## + covid3 1 0.143 341.27 144.39
## + covid1 1 0.143 341.27 144.39
## + covid2 1 0.140 341.27 144.39
## - quiz3 1 119.594 461.01 183.39
##
## Step: AIC=140.51
## quiz4 ~ quiz2 + quiz3 + covid4 + study1 + study2 + study3 + study4
##
## Df Sum of Sq RSS AIC
## - study2 1 0.356 341.92 138.66
## - covid4 1 0.435 342.00 138.69
## - quiz2 1 1.009 342.58 138.93
## - study1 1 3.728 345.29 140.06
## - study3 1 3.881 345.45 140.12
## - study4 1 4.458 346.02 140.36
## <none> 341.57 140.51
## + quiz1 1 0.152 341.41 142.45
## + covid1 1 0.127 341.44 142.46
## + covid2 1 0.105 341.46 142.47
## + covid3 1 0.100 341.47 142.47
## - quiz3 1 133.044 474.61 185.55
##
## Step: AIC=138.66
## quiz4 ~ quiz2 + quiz3 + covid4 + study1 + study3 + study4
##
## Df Sum of Sq RSS AIC
## - covid4 1 0.457 342.38 136.85
## - quiz2 1 0.995 342.92 137.07
## - study3 1 3.564 345.49 138.14
## <none> 341.92 138.66
## - study4 1 4.924 346.85 138.70
## - study1 1 5.322 347.24 138.87

```

```

## + study2 1      0.356 341.57 140.51
## + quiz1 1      0.150 341.77 140.60
## + covid1 1      0.104 341.82 140.62
## + covid3 1      0.103 341.82 140.62
## + covid2 1      0.076 341.85 140.63
## - quiz3 1    134.286 476.21 184.03
##
## Step: AIC=136.85
## quiz4 ~ quiz2 + quiz3 + study1 + study3 + study4
##
##      Df Sum of Sq    RSS    AIC
## - quiz2 1      0.886 343.26 135.22
## - study3 1      3.760 346.14 136.41
## <none>                342.38 136.85
## - study4 1      4.896 347.27 136.88
## - study1 1      5.398 347.78 137.09
## + covid4 1      0.457 341.92 138.66
## + study2 1      0.378 342.00 138.69
## + quiz1 1      0.226 342.15 138.75
## + covid3 1      0.071 342.31 138.82
## + covid2 1      0.034 342.34 138.84
## + covid1 1      0.028 342.35 138.84
## - quiz3 1    134.350 476.73 182.19
##
## Step: AIC=135.22
## quiz4 ~ quiz3 + study1 + study3 + study4
##
##      Df Sum of Sq    RSS    AIC
## - study3 1      4.110 347.38 134.92
## <none>                343.26 135.22
## - study4 1      5.138 348.40 135.34
## - study1 1      5.208 348.47 135.37
## + quiz2 1      0.886 342.38 136.85
## + quiz1 1      0.387 342.88 137.06
## + study2 1      0.361 342.90 137.07
## + covid4 1      0.347 342.92 137.07
## + covid3 1      0.033 343.23 137.21
## + covid1 1      0.011 343.25 137.22
## + covid2 1      0.009 343.26 137.22
## - quiz3 1    147.031 490.30 184.20
##
## Step: AIC=134.92
## quiz4 ~ quiz3 + study1 + study4
##
##      Df Sum of Sq    RSS    AIC
## - study4 1      1.827 349.20 133.67
## - study1 1      2.050 349.43 133.76
## <none>                347.38 134.92
## + study3 1      4.110 343.26 135.22
## + quiz2 1      1.236 346.14 136.41
## + covid4 1      0.508 346.87 136.71
## + quiz1 1      0.382 346.99 136.76
## + covid3 1      0.089 347.29 136.88
## + covid1 1      0.076 347.30 136.89

```

```

## + study2 1 0.063 347.31 136.90
## + covid2 1 0.004 347.37 136.92
## - quiz3 1 143.010 490.39 182.23
##
## Step: AIC=133.67
## quiz4 ~ quiz3 + study1
##
## Df Sum of Sq RSS AIC
## - study1 1 3.814 353.02 133.22
## <none> 349.20 133.67
## + study4 1 1.827 347.38 134.92
## + quiz2 1 1.254 347.95 135.16
## + study3 1 0.800 348.40 135.34
## + quiz1 1 0.484 348.72 135.47
## + covid4 1 0.397 348.80 135.51
## + covid1 1 0.133 349.07 135.62
## + study2 1 0.095 349.11 135.63
## + covid2 1 0.040 349.16 135.66
## + covid3 1 0.022 349.18 135.66
## - quiz3 1 145.693 494.89 181.53
##
## Step: AIC=133.22
## quiz4 ~ quiz3
##
## Df Sum of Sq RSS AIC
## <none> 353.02 133.22
## + study1 1 3.814 349.20 133.67
## + study4 1 3.591 349.43 133.76
## + study2 1 2.076 350.94 134.38
## + quiz2 1 0.806 352.21 134.90
## + quiz1 1 0.463 352.55 135.04
## + covid4 1 0.337 352.68 135.09
## + study3 1 0.173 352.84 135.16
## + covid1 1 0.157 352.86 135.16
## + covid2 1 0.106 352.91 135.18
## + covid3 1 0.001 353.01 135.22
## - quiz3 1 144.341 497.36 180.24

```

```
step7$anova
```

```

## Stepwise Model Path
## Analysis of Deviance Table
##
## Initial Model:
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
## study1 + study2 + study3 + study4
##
## Final Model:
## quiz4 ~ quiz3
##
## Step Df Deviance Resid. Df Resid. Dev AIC
## 1 131 341.2204 148.3648
## 2 - covid2 1 0.0009260221 132 341.2213 146.3652

```

## 3	- covid1	1	0.0490884985	133	341.2704	144.3858
## 4	- covid3	1	0.1432301654	134	341.4136	142.4458
## 5	- quiz1	1	0.1521621022	135	341.5658	140.5095
## 6	- study2	1	0.3561078580	136	341.9219	138.6585
## 7	- covid4	1	0.4567453544	137	342.3787	136.8494
## 8	- quiz2	1	0.8861698836	138	343.2648	135.2190
## 9	- study3	1	4.1104189581	139	347.3752	134.9212
## 10	- study4	1	1.8271532242	140	349.2024	133.6714
## 11	- study1	1	3.8135564833	141	353.0160	133.2246

```

full_model.fit2 = lm(
  quiz4 ~ quiz1 + quiz2 + quiz3
  + covid1 + covid2 + covid3 + covid4
  + study1 + study2 + study3 + study4

  + I(quiz1 ^ 2) + I(quiz2 ^ 2) + I(quiz3 ^ 2)
  + I(covid1 ^ 2) + I(covid2 ^ 2) + I(covid3 ^ 2) + I(covid4 ^ 2)
  + I(study1 ^ 2) + I(study2 ^ 2) + I(study3 ^ 2) + I(study4 ^ 2)

  + I(quiz1 * quiz2) + I(quiz1 * quiz3) + I(quiz1 * quiz4) + I(quiz1 * covid1) + I(quiz1 * covid2)
  + I(quiz1 * covid3) + I(quiz1 * covid4) + I(quiz1 * study1) + I(quiz1 * study2) + I(quiz1 * study3)
  + I(quiz1 * study4)

  + I(quiz2 * quiz3) + I(quiz2 * quiz4) + I(quiz2 * covid1) + I(quiz2 * covid2) + I(quiz2 * covid3)
  + I(quiz2 * covid4) + I(quiz2 * study1) + I(quiz2 * study2) + I(quiz2 * study3) + I(quiz2 * study4)

  + I(quiz3 * quiz4) + I(quiz3 * covid1) + I(quiz3 * covid2) + I(quiz3 * covid3) + I(quiz3 * covid4)
  + I(quiz3 * study1) + I(quiz3 * study2) + I(quiz3 * study3) + I(quiz3 * study4)

  + I(quiz4 * covid1) + I(quiz4 * covid2) + I(quiz4 * covid3) + I(quiz4 * covid4) + I(quiz4 * study1)
  + I(quiz4 * study2) + I(quiz4 * study3) + I(quiz4 * study4)

  + I(covid1 * covid2) + I(covid1 * covid3) + I(covid1 * covid4) + I(covid1 * study1) + I(covid1 * study2)
  + I(covid1 * study3) + I(covid1 * study4)

  + I(covid2 * covid3) + I(covid2 * covid4) + I(covid2 * study1) + I(covid2 * study2) + I(covid2 * study3)
  + I(covid2 * study4)

  + I(covid3 * covid4) + I(covid3 * study1) + I(covid3 * study2) + I(covid3 * study3) + I(covid3 * study4)

  + I(covid4 * study1) + I(covid4 * study2) + I(covid4 * study3) + I(covid4 * study4)

  + I(study1 * study2) + I(study1 * study3) + I(study1 * study4)

  + I(study2 * study3) + I(study2 * study4)

  + I(study3 * study4)
)

```

```

step8 = stepAIC(full_model.fit2, direction = "both")

```

```

## Start:  AIC=-433.02
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
##   study1 + study2 + study3 + study4 + I(quiz1^2) + I(quiz2^2) +
##   I(quiz3^2) + I(covid1^2) + I(covid2^2) + I(covid3^2) + I(covid4^2) +
##   I(study1^2) + I(study2^2) + I(study3^2) + I(study4^2) + I(quiz1 *
##   quiz2) + I(quiz1 * quiz3) + I(quiz1 * quiz4) + I(quiz1 *
##   covid1) + I(quiz1 * covid2) + I(quiz1 * covid3) + I(quiz1 *
##   covid4) + I(quiz1 * study1) + I(quiz1 * study2) + I(quiz1 *
##   study3) + I(quiz1 * study4) + I(quiz2 * quiz3) + I(quiz2 *
##   quiz4) + I(quiz2 * covid1) + I(quiz2 * covid2) + I(quiz2 *
##   covid3) + I(quiz2 * covid4) + I(quiz2 * study1) + I(quiz2 *
##   study2) + I(quiz2 * study3) + I(quiz2 * study4) + I(quiz3 *

```

```

##      quiz4) + I(quiz3 * covid1) + I(quiz3 * covid2) + I(quiz3 *
##      covid3) + I(quiz3 * covid4) + I(quiz3 * study1) + I(quiz3 *
##      study2) + I(quiz3 * study3) + I(quiz3 * study4) + I(quiz4 *
##      covid1) + I(quiz4 * covid2) + I(quiz4 * covid3) + I(quiz4 *
##      covid4) + I(quiz4 * study1) + I(quiz4 * study2) + I(quiz4 *
##      study3) + I(quiz4 * study4) + I(covid1 * covid2) + I(covid1 *
##      covid3) + I(covid1 * covid4) + I(covid1 * study1) + I(covid1 *
##      study2) + I(covid1 * study3) + I(covid1 * study4) + I(covid2 *
##      covid3) + I(covid2 * covid4) + I(covid2 * study1) + I(covid2 *
##      study2) + I(covid2 * study3) + I(covid2 * study4) + I(covid3 *
##      covid4) + I(covid3 * study1) + I(covid3 * study2) + I(covid3 *
##      study3) + I(covid3 * study4) + I(covid4 * study1) + I(covid4 *
##      study2) + I(covid4 * study3) + I(covid4 * study4) + I(study1 *
##      study2) + I(study1 * study3) + I(study1 * study4) + I(study2 *
##      study3) + I(study2 * study4) + I(study3 * study4)
##
##
##      Df Sum of Sq    RSS    AIC
## - I(study3 * study4)  1   0.00000  1.9936 -435.02
## - I(quiz1 * study3)   1   0.00002  1.9936 -435.02
## - I(quiz2 * study1)   1   0.00003  1.9936 -435.02
## - I(quiz4 * study4)   1   0.00025  1.9939 -435.01
## - I(quiz1 * study2)   1   0.00029  1.9939 -435.00
## - study2              1   0.00029  1.9939 -435.00
## - I(covid2 * study1)  1   0.00062  1.9942 -434.98
## - I(covid4 * study4)  1   0.00096  1.9946 -434.96
## - I(study2 * study4)  1   0.00110  1.9947 -434.94
## - I(quiz2 * covid3)   1   0.00129  1.9949 -434.93
## - I(study3^2)         1   0.00149  1.9951 -434.92
## - I(quiz3 * study2)   1   0.00152  1.9951 -434.91
## - I(quiz3 * study4)   1   0.00192  1.9955 -434.89
## - I(covid2 * study2)  1   0.00219  1.9958 -434.87
## - I(covid2^2)         1   0.00241  1.9960 -434.85
## - I(quiz4 * covid4)   1   0.00278  1.9964 -434.82
## - I(covid1 * study3)  1   0.00280  1.9964 -434.82
## - I(covid3 * study4)  1   0.00289  1.9965 -434.82
## - I(covid1 * study2)  1   0.00388  1.9975 -434.75
## - I(quiz1 * study4)   1   0.00574  1.9994 -434.61
## - I(covid4 * study1)  1   0.00721  2.0008 -434.51
## - I(quiz2 * covid1)   1   0.00744  2.0011 -434.49
## - I(study1 * study3)  1   0.00898  2.0026 -434.38
## - I(study1 * study2)  1   0.00908  2.0027 -434.37
## - I(quiz4 * study2)   1   0.00914  2.0028 -434.37
## - I(covid3 * study1)  1   0.00985  2.0035 -434.32
## - I(quiz3 * covid2)   1   0.01105  2.0047 -434.23
## - I(covid1 * study4)  1   0.01284  2.0065 -434.11
## - I(quiz3 * covid1)   1   0.01305  2.0067 -434.09
## - I(covid2 * study3)  1   0.01623  2.0098 -433.86
## - I(quiz2 * covid4)   1   0.01635  2.0100 -433.86
## - I(quiz3 * covid4)   1   0.02019  2.0138 -433.58
## - I(covid1 * study1)  1   0.02095  2.0146 -433.53
## - I(covid1 * covid3)  1   0.02581  2.0194 -433.18
## - I(study1 * study4)  1   0.02583  2.0194 -433.18
## - I(quiz3 * covid3)   1   0.02604  2.0197 -433.17
## <none>                1.9936 -433.02

```



```

## - quiz1          1    0.02832 2.0219 -433.01
## - I(quiz2^2)      1    0.03006 2.0237 -432.88
## - I(study1^2)     1    0.03014 2.0238 -432.88
## - I(covid1 * covid2) 1    0.03101 2.0246 -432.82
## - I(covid2 * study4) 1    0.03129 2.0249 -432.80
## - I(study2 * study3) 1    0.03156 2.0252 -432.78
## - I(quiz2 * study2) 1    0.03212 2.0257 -432.74
## - quiz2          1    0.03560 2.0292 -432.49
## - I(covid3^2)     1    0.03652 2.0301 -432.43
## - I(quiz1^2)      1    0.03854 2.0322 -432.29
## - I(quiz3 * study1) 1    0.03977 2.0334 -432.20
## - I(study2^2)     1    0.03984 2.0335 -432.19
## - I(covid3 * study2) 1    0.04314 2.0368 -431.96
## - I(covid4 * study2) 1    0.04743 2.0410 -431.66
## - study3         1    0.04843 2.0420 -431.59
## - I(quiz2 * study3) 1    0.04856 2.0422 -431.58
## - I(covid1^2)     1    0.04910 2.0427 -431.54
## - I(study4^2)     1    0.05166 2.0453 -431.37
## - I(quiz2 * covid2) 1    0.05353 2.0471 -431.24
## - I(covid2 * covid4) 1    0.05695 2.0506 -431.00
## - I(quiz3^2)      1    0.05911 2.0527 -430.85
## - I(covid4 * study3) 1    0.06101 2.0546 -430.71
## - I(quiz4 * covid1) 1    0.06315 2.0568 -430.56
## - I(quiz2 * study4) 1    0.06433 2.0579 -430.48
## - I(quiz1 * study1) 1    0.06601 2.0596 -430.37
## - study4         1    0.07101 2.0646 -430.02
## - I(covid3 * covid4) 1    0.07871 2.0723 -429.49
## - I(quiz1 * covid4) 1    0.07941 2.0730 -429.44
## - I(quiz3 * study3) 1    0.10365 2.0973 -427.78
## - I(covid1 * covid4) 1    0.10434 2.0980 -427.73
## - study1         1    0.11534 2.1090 -426.98
## - I(covid4^2)     1    0.12868 2.1223 -426.08
## - I(covid2 * covid3) 1    0.14487 2.1385 -424.99
## - I(quiz1 * quiz2) 1    0.15837 2.1520 -424.09
## - I(quiz1 * covid3) 1    0.17040 2.1640 -423.30
## - I(quiz1 * covid1) 1    0.17048 2.1641 -423.29
## - I(quiz4 * covid3) 1    0.20649 2.2001 -420.93
## - covid1         1    0.20739 2.2010 -420.87
## - I(quiz1 * covid2) 1    0.20793 2.2015 -420.84
## - covid3         1    0.21809 2.2117 -420.18
## - I(quiz3 * quiz4) 1    0.21988 2.2135 -420.06
## - I(covid3 * study3) 1    0.23296 2.2266 -419.22
## - I(quiz2 * quiz3) 1    0.24327 2.2369 -418.56
## - I(quiz4 * covid2) 1    0.25534 2.2490 -417.79
## - quiz3          1    0.26225 2.2559 -417.35
## - covid4         1    0.26698 2.2606 -417.05
## - I(quiz4 * study1) 1    0.28284 2.2765 -416.05
## - covid2         1    0.31091 2.3045 -414.30
## - I(quiz4 * study3) 1    0.33329 2.3269 -412.92
## - I(quiz2 * quiz4) 1    0.41227 2.4059 -408.14
## - I(quiz1 * quiz3) 1    0.92197 2.9156 -380.67
## - I(quiz1 * quiz4) 1    1.43702 3.4306 -357.40
##
## Step:  AIC=-435.02

```

```

## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
##   study1 + study2 + study3 + study4 + I(quiz1^2) + I(quiz2^2) +
##   I(quiz3^2) + I(covid1^2) + I(covid2^2) + I(covid3^2) + I(covid4^2) +
##   I(study1^2) + I(study2^2) + I(study3^2) + I(study4^2) + I(quiz1 *
##   quiz2) + I(quiz1 * quiz3) + I(quiz1 * quiz4) + I(quiz1 *
##   covid1) + I(quiz1 * covid2) + I(quiz1 * covid3) + I(quiz1 *
##   covid4) + I(quiz1 * study1) + I(quiz1 * study2) + I(quiz1 *
##   study3) + I(quiz1 * study4) + I(quiz2 * quiz3) + I(quiz2 *
##   quiz4) + I(quiz2 * covid1) + I(quiz2 * covid2) + I(quiz2 *
##   covid3) + I(quiz2 * covid4) + I(quiz2 * study1) + I(quiz2 *
##   study2) + I(quiz2 * study3) + I(quiz2 * study4) + I(quiz3 *
##   quiz4) + I(quiz3 * covid1) + I(quiz3 * covid2) + I(quiz3 *
##   covid3) + I(quiz3 * covid4) + I(quiz3 * study1) + I(quiz3 *
##   study2) + I(quiz3 * study3) + I(quiz3 * study4) + I(quiz4 *
##   covid1) + I(quiz4 * covid2) + I(quiz4 * covid3) + I(quiz4 *
##   covid4) + I(quiz4 * study1) + I(quiz4 * study2) + I(quiz4 *
##   study3) + I(quiz4 * study4) + I(covid1 * covid2) + I(covid1 *
##   covid3) + I(covid1 * covid4) + I(covid1 * study1) + I(covid1 *
##   study2) + I(covid1 * study3) + I(covid1 * study4) + I(covid2 *
##   covid3) + I(covid2 * covid4) + I(covid2 * study1) + I(covid2 *
##   study2) + I(covid2 * study3) + I(covid2 * study4) + I(covid3 *
##   covid4) + I(covid3 * study1) + I(covid3 * study2) + I(covid3 *
##   study3) + I(covid3 * study4) + I(covid4 * study1) + I(covid4 *
##   study2) + I(covid4 * study3) + I(covid4 * study4) + I(study1 *
##   study2) + I(study1 * study3) + I(study1 * study4) + I(study2 *
##   study3) + I(study2 * study4)
##
##
##           Df Sum of Sq    RSS    AIC
## - I(quiz1 * study3)    1    0.00002 1.9936 -437.02
## - I(quiz2 * study1)    1    0.00003 1.9937 -437.02
## - I(quiz4 * study4)    1    0.00025 1.9939 -437.01
## - I(quiz1 * study2)    1    0.00030 1.9939 -437.00
## - study2              1    0.00036 1.9940 -437.00
## - I(covid2 * study1)  1    0.00065 1.9943 -436.98
## - I(covid4 * study4)  1    0.00098 1.9946 -436.95
## - I(quiz2 * covid3)   1    0.00130 1.9949 -436.93
## - I(quiz3 * study2)   1    0.00170 1.9953 -436.90
## - I(study2 * study4)  1    0.00188 1.9955 -436.89
## - I(quiz3 * study4)   1    0.00221 1.9958 -436.87
## - I(covid2 * study2)  1    0.00221 1.9958 -436.87
## - I(covid2^2)         1    0.00242 1.9960 -436.85
## - I(study3^2)         1    0.00276 1.9964 -436.83
## - I(quiz4 * covid4)   1    0.00284 1.9965 -436.82
## - I(covid3 * study4)  1    0.00292 1.9965 -436.81
## - I(covid1 * study3)  1    0.00304 1.9967 -436.81
## - I(covid1 * study2)  1    0.00392 1.9975 -436.74
## - I(quiz1 * study4)   1    0.00656 2.0002 -436.55
## - I(quiz2 * covid1)   1    0.00768 2.0013 -436.47
## - I(covid4 * study1)  1    0.00832 2.0019 -436.43
## - I(study1 * study3)  1    0.00908 2.0027 -436.37
## - I(quiz4 * study2)   1    0.00972 2.0033 -436.33
## - I(covid3 * study1)  1    0.01046 2.0041 -436.28
## - I(study1 * study2)  1    0.01076 2.0044 -436.25
## - I(quiz3 * covid2)   1    0.01133 2.0049 -436.21

```

```

## - I(quiz3 * covid1) 1 0.01479 2.0084 -435.97
## - I(covid2 * study3) 1 0.01623 2.0098 -435.86
## - I(quiz2 * covid4) 1 0.01638 2.0100 -435.85
## - I(covid1 * study4) 1 0.01890 2.0125 -435.67
## - I(quiz3 * covid4) 1 0.02154 2.0152 -435.49
## - I(covid1 * study1) 1 0.02172 2.0153 -435.47
## - I(study1 * study4) 1 0.02594 2.0196 -435.18
## - I(quiz3 * covid3) 1 0.02742 2.0210 -435.07
## <none> 1.9936 -435.02
## - quiz1 1 0.02960 2.0232 -434.92
## - I(covid1 * covid2) 1 0.03148 2.0251 -434.78
## - I(quiz2 * study2) 1 0.03289 2.0265 -434.68
## - I(covid1 * covid3) 1 0.03327 2.0269 -434.66
## - I(study1^2) 1 0.03350 2.0271 -434.64
## - I(covid2 * study4) 1 0.03397 2.0276 -434.61
## - I(quiz2^2) 1 0.03449 2.0281 -434.57
## - quiz2 1 0.03610 2.0297 -434.46
## - I(covid3^2) 1 0.03687 2.0305 -434.40
## - I(study2 * study3) 1 0.03883 2.0324 -434.27
## - I(quiz3 * study1) 1 0.03979 2.0334 -434.20
## - I(quiz1^2) 1 0.04312 2.0367 -433.96
## - I(covid3 * study2) 1 0.04402 2.0376 -433.90
## - I(study2^2) 1 0.04580 2.0394 -433.78
## - I(covid4 * study2) 1 0.04761 2.0412 -433.65
## - I(quiz2 * study3) 1 0.04876 2.0424 -433.57
## - I(covid1^2) 1 0.04954 2.0432 -433.51
## - study3 1 0.05435 2.0480 -433.18
## - I(quiz2 * covid2) 1 0.05480 2.0484 -433.15
## + I(study3 * study4) 1 0.00000 1.9936 -433.02
## - I(covid2 * covid4) 1 0.05813 2.0517 -432.91
## - I(quiz3^2) 1 0.05910 2.0527 -432.85
## - I(covid4 * study3) 1 0.06159 2.0552 -432.67
## - I(quiz2 * study4) 1 0.06503 2.0587 -432.43
## - I(quiz1 * study1) 1 0.06605 2.0597 -432.36
## - I(quiz4 * covid1) 1 0.06696 2.0606 -432.30
## - study4 1 0.07167 2.0653 -431.97
## - I(quiz1 * covid4) 1 0.08058 2.0742 -431.36
## - I(covid3 * covid4) 1 0.08145 2.0751 -431.30
## - I(study4^2) 1 0.08867 2.0823 -430.80
## - study1 1 0.12651 2.1201 -428.23
## - I(covid4^2) 1 0.13549 2.1291 -427.62
## - I(quiz3 * study3) 1 0.14522 2.1388 -426.97
## - I(covid1 * covid4) 1 0.15598 2.1496 -426.25
## - I(covid2 * covid3) 1 0.15683 2.1504 -426.20
## - I(quiz1 * quiz2) 1 0.17292 2.1665 -425.13
## - I(quiz1 * covid1) 1 0.17424 2.1679 -425.04
## - I(quiz1 * covid3) 1 0.17939 2.1730 -424.70
## - I(quiz4 * covid3) 1 0.20759 2.2012 -422.86
## - covid1 1 0.21461 2.2082 -422.40
## - I(quiz3 * quiz4) 1 0.22033 2.2139 -422.03
## - I(quiz1 * covid2) 1 0.23436 2.2280 -421.13
## - I(covid3 * study3) 1 0.23608 2.2297 -421.02
## - covid3 1 0.24871 2.2423 -420.21
## - I(quiz4 * covid2) 1 0.25538 2.2490 -419.79

```

```

## - quiz3          1  0.26282 2.2564 -419.32
## - I(quiz2 * quiz3) 1  0.26308 2.2567 -419.30
## - covid4         1  0.26752 2.2611 -419.02
## - I(quiz4 * study1) 1  0.29516 2.2888 -417.28
## - covid2         1  0.33451 2.3281 -414.84
## - I(quiz4 * study3) 1  0.38747 2.3811 -411.63
## - I(quiz2 * quiz4) 1  0.42283 2.4165 -409.52
## - I(quiz1 * quiz3) 1  0.94777 2.9414 -381.41
## - I(quiz1 * quiz4) 1  1.46830 3.4619 -358.11
##
## Step:  AIC=-437.02
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
##   study1 + study2 + study3 + study4 + I(quiz1^2) + I(quiz2^2) +
##   I(quiz3^2) + I(covid1^2) + I(covid2^2) + I(covid3^2) + I(covid4^2) +
##   I(study1^2) + I(study2^2) + I(study3^2) + I(study4^2) + I(quiz1 *
##   quiz2) + I(quiz1 * quiz3) + I(quiz1 * quiz4) + I(quiz1 *
##   covid1) + I(quiz1 * covid2) + I(quiz1 * covid3) + I(quiz1 *
##   covid4) + I(quiz1 * study1) + I(quiz1 * study2) + I(quiz1 *
##   study4) + I(quiz2 * quiz3) + I(quiz2 * quiz4) + I(quiz2 *
##   covid1) + I(quiz2 * covid2) + I(quiz2 * covid3) + I(quiz2 *
##   covid4) + I(quiz2 * study1) + I(quiz2 * study2) + I(quiz2 *
##   study3) + I(quiz2 * study4) + I(quiz3 * quiz4) + I(quiz3 *
##   covid1) + I(quiz3 * covid2) + I(quiz3 * covid3) + I(quiz3 *
##   covid4) + I(quiz3 * study1) + I(quiz3 * study2) + I(quiz3 *
##   study3) + I(quiz3 * study4) + I(quiz4 * covid1) + I(quiz4 *
##   covid2) + I(quiz4 * covid3) + I(quiz4 * covid4) + I(quiz4 *
##   study1) + I(quiz4 * study2) + I(quiz4 * study3) + I(quiz4 *
##   study4) + I(covid1 * covid2) + I(covid1 * covid3) + I(covid1 *
##   covid4) + I(covid1 * study1) + I(covid1 * study2) + I(covid1 *
##   study3) + I(covid1 * study4) + I(covid2 * covid3) + I(covid2 *
##   covid4) + I(covid2 * study1) + I(covid2 * study2) + I(covid2 *
##   study3) + I(covid2 * study4) + I(covid3 * covid4) + I(covid3 *
##   study1) + I(covid3 * study2) + I(covid3 * study3) + I(covid3 *
##   study4) + I(covid4 * study1) + I(covid4 * study2) + I(covid4 *
##   study3) + I(covid4 * study4) + I(study1 * study2) + I(study1 *
##   study3) + I(study1 * study4) + I(study2 * study3) + I(study2 *
##   study4)
##
##
##           Df Sum of Sq   RSS   AIC
## - I(quiz2 * study1)  1  0.00003 1.9937 -439.02
## - I(quiz4 * study4)  1  0.00025 1.9939 -439.00
## - study2            1  0.00035 1.9940 -439.00
## - I(quiz1 * study2)  1  0.00046 1.9941 -438.99
## - I(covid2 * study1) 1  0.00064 1.9943 -438.98
## - I(covid4 * study4) 1  0.00099 1.9946 -438.95
## - I(quiz2 * covid3)  1  0.00132 1.9950 -438.93
## - I(study2 * study4) 1  0.00186 1.9955 -438.89
## - I(quiz3 * study2)  1  0.00218 1.9958 -438.87
## - I(quiz3 * study4)  1  0.00219 1.9958 -438.86
## - I(covid2 * study2) 1  0.00222 1.9959 -438.86
## - I(covid2^2)        1  0.00242 1.9961 -438.85
## - I(study3^2)        1  0.00274 1.9964 -438.83
## - I(quiz4 * covid4)  1  0.00288 1.9965 -438.82
## - I(covid3 * study4) 1  0.00293 1.9966 -438.81

```

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## - I(covid1 * study3) 1 0.00324 1.9969 -438.79
## - I(covid1 * study2) 1 0.00392 1.9976 -438.74
## - I(quiz1 * study4) 1 0.00659 2.0002 -438.55
## - I(quiz2 * covid1) 1 0.00770 2.0013 -438.47
## - I(covid4 * study1) 1 0.00831 2.0020 -438.43
## - I(study1 * study3) 1 0.00912 2.0028 -438.37
## - I(quiz4 * study2) 1 0.00972 2.0034 -438.33
## - I(covid3 * study1) 1 0.01059 2.0042 -438.26
## - I(study1 * study2) 1 0.01074 2.0044 -438.25
## - I(quiz3 * covid2) 1 0.01155 2.0052 -438.20
## - I(quiz3 * covid1) 1 0.01489 2.0085 -437.96
## - I(covid2 * study3) 1 0.01638 2.0100 -437.85
## - I(quiz2 * covid4) 1 0.01641 2.0101 -437.85
## - I(covid1 * study4) 1 0.01888 2.0125 -437.67
## - I(covid1 * study1) 1 0.02212 2.0158 -437.44
## - I(quiz3 * covid4) 1 0.02253 2.0162 -437.41
## - I(study1 * study4) 1 0.02602 2.0197 -437.17
## <none> 1.9936 -437.02
## - I(quiz3 * covid3) 1 0.02825 2.0219 -437.01
## - quiz1 1 0.03056 2.0242 -436.85
## - I(covid1 * covid2) 1 0.03152 2.0252 -436.78
## - I(covid1 * covid3) 1 0.03326 2.0269 -436.66
## - I(study1^2) 1 0.03350 2.0271 -436.64
## - I(covid2 * study4) 1 0.03395 2.0276 -436.61
## - I(quiz2^2) 1 0.03447 2.0281 -436.57
## - I(quiz2 * study2) 1 0.03564 2.0293 -436.49
## - I(covid3^2) 1 0.03744 2.0311 -436.36
## - I(study2 * study3) 1 0.03884 2.0325 -436.26
## - quiz2 1 0.03913 2.0328 -436.24
## - I(quiz3 * study1) 1 0.04001 2.0336 -436.18
## - I(quiz1^2) 1 0.04437 2.0380 -435.87
## - I(covid3 * study2) 1 0.04575 2.0394 -435.78
## - I(study2^2) 1 0.04612 2.0398 -435.75
## - I(covid4 * study2) 1 0.04759 2.0412 -435.65
## - I(covid1^2) 1 0.04953 2.0432 -435.51
## - I(quiz2 * study3) 1 0.05283 2.0465 -435.28
## - study3 1 0.05433 2.0480 -435.18
## + I(quiz1 * study3) 1 0.00002 1.9936 -435.02
## + I(study3 * study4) 1 0.00000 1.9936 -435.02
## - I(quiz2 * covid2) 1 0.05749 2.0511 -434.96
## - I(covid2 * covid4) 1 0.05812 2.0518 -434.91
## - I(quiz3^2) 1 0.05916 2.0528 -434.84
## - I(covid4 * study3) 1 0.06201 2.0556 -434.64
## - I(quiz1 * study1) 1 0.06603 2.0597 -434.36
## - I(quiz2 * study4) 1 0.06695 2.0606 -434.30
## - I(quiz4 * covid1) 1 0.06703 2.0607 -434.29
## - study4 1 0.07205 2.0657 -433.95
## - I(quiz1 * covid4) 1 0.08282 2.0765 -433.20
## - I(covid3 * covid4) 1 0.08614 2.0798 -432.97
## - I(study4^2) 1 0.09091 2.0846 -432.65
## - study1 1 0.12762 2.1213 -430.15
## - I(covid4^2) 1 0.14148 2.1351 -429.22
## - I(covid1 * covid4) 1 0.15616 2.1498 -428.24
## - I(covid2 * covid3) 1 0.16179 2.1554 -427.86

```

```

## - I(quiz1 * covid1)    1    0.17422 2.1679 -427.04
## - I(quiz1 * quiz2)     1    0.17930 2.1729 -426.71
## - I(quiz1 * covid3)    1    0.18624 2.1799 -426.25
## - I(quiz3 * study3)    1    0.19541 2.1890 -425.65
## - I(quiz4 * covid3)    1    0.21083 2.2045 -424.65
## - covid1               1    0.21892 2.2126 -424.12
## - I(quiz3 * quiz4)     1    0.22570 2.2193 -423.69
## - I(covid3 * study3)   1    0.23751 2.2312 -422.93
## - I(quiz1 * covid2)    1    0.23857 2.2322 -422.86
## - covid3               1    0.25233 2.2460 -421.98
## - I(quiz2 * quiz3)     1    0.26353 2.2572 -421.27
## - quiz3                1    0.26603 2.2597 -421.11
## - covid4               1    0.26847 2.2621 -420.96
## - I(quiz4 * covid2)    1    0.27738 2.2710 -420.39
## - I(quiz4 * study1)    1    0.29816 2.2918 -419.09
## - covid2               1    0.33934 2.3330 -416.54
## - I(quiz4 * study3)    1    0.39648 2.3901 -413.08
## - I(quiz2 * quiz4)     1    0.43087 2.4245 -411.04
## - I(quiz1 * quiz3)     1    0.94933 2.9430 -383.33
## - I(quiz1 * quiz4)     1    1.49586 3.4895 -358.97
##
## Step:  AIC=-439.02
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
##   study1 + study2 + study3 + study4 + I(quiz1^2) + I(quiz2^2) +
##   I(quiz3^2) + I(covid1^2) + I(covid2^2) + I(covid3^2) + I(covid4^2) +
##   I(study1^2) + I(study2^2) + I(study3^2) + I(study4^2) + I(quiz1 *
##   quiz2) + I(quiz1 * quiz3) + I(quiz1 * quiz4) + I(quiz1 *
##   covid1) + I(quiz1 * covid2) + I(quiz1 * covid3) + I(quiz1 *
##   covid4) + I(quiz1 * study1) + I(quiz1 * study2) + I(quiz1 *
##   study4) + I(quiz2 * quiz3) + I(quiz2 * quiz4) + I(quiz2 *
##   covid1) + I(quiz2 * covid2) + I(quiz2 * covid3) + I(quiz2 *
##   covid4) + I(quiz2 * study2) + I(quiz2 * study3) + I(quiz2 *
##   study4) + I(quiz3 * quiz4) + I(quiz3 * covid1) + I(quiz3 *
##   covid2) + I(quiz3 * covid3) + I(quiz3 * covid4) + I(quiz3 *
##   study1) + I(quiz3 * study2) + I(quiz3 * study3) + I(quiz3 *
##   study4) + I(quiz4 * covid1) + I(quiz4 * covid2) + I(quiz4 *
##   covid3) + I(quiz4 * covid4) + I(quiz4 * study1) + I(quiz4 *
##   study2) + I(quiz4 * study3) + I(quiz4 * study4) + I(covid1 *
##   covid2) + I(covid1 * covid3) + I(covid1 * covid4) + I(covid1 *
##   study1) + I(covid1 * study2) + I(covid1 * study3) + I(covid1 *
##   study4) + I(covid2 * covid3) + I(covid2 * covid4) + I(covid2 *
##   study1) + I(covid2 * study2) + I(covid2 * study3) + I(covid2 *
##   study4) + I(covid3 * covid4) + I(covid3 * study1) + I(covid3 *
##   study2) + I(covid3 * study3) + I(covid3 * study4) + I(covid4 *
##   study1) + I(covid4 * study2) + I(covid4 * study3) + I(covid4 *
##   study4) + I(study1 * study2) + I(study1 * study3) + I(study1 *
##   study4) + I(study2 * study3) + I(study2 * study4)
##
##               Df Sum of Sq    RSS    AIC
## - I(quiz4 * study4)  1    0.00028 1.9940 -441.00
## - study2             1    0.00045 1.9941 -440.99
## - I(quiz1 * study2)  1    0.00051 1.9942 -440.98
## - I(covid2 * study1) 1    0.00080 1.9945 -440.96
## - I(covid4 * study4) 1    0.00096 1.9946 -440.95

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## - I(quiz2 * covid3) 1 0.00130 1.9950 -440.93
## - I(quiz3 * study2) 1 0.00217 1.9958 -440.86
## - I(study2 * study4) 1 0.00225 1.9959 -440.86
## - I(quiz3 * study4) 1 0.00225 1.9959 -440.86
## - I(covid2^2) 1 0.00239 1.9961 -440.85
## - I(covid2 * study2) 1 0.00258 1.9963 -440.83
## - I(quiz4 * covid4) 1 0.00299 1.9967 -440.81
## - I(study3^2) 1 0.00299 1.9967 -440.81
## - I(covid3 * study4) 1 0.00308 1.9968 -440.80
## - I(covid1 * study3) 1 0.00329 1.9970 -440.78
## - I(covid1 * study2) 1 0.00396 1.9976 -440.74
## - I(quiz1 * study4) 1 0.00658 2.0003 -440.55
## - I(quiz2 * covid1) 1 0.00770 2.0014 -440.47
## - I(covid4 * study1) 1 0.00845 2.0021 -440.41
## - I(study1 * study3) 1 0.00982 2.0035 -440.32
## - I(covid3 * study1) 1 0.01063 2.0043 -440.26
## - I(quiz4 * study2) 1 0.01159 2.0053 -440.19
## - I(quiz3 * covid2) 1 0.01316 2.0068 -440.08
## - I(study1 * study2) 1 0.01326 2.0069 -440.07
## - I(quiz3 * covid1) 1 0.01607 2.0097 -439.87
## - I(quiz2 * covid4) 1 0.01641 2.0101 -439.85
## - I(covid2 * study3) 1 0.01651 2.0102 -439.84
## - I(covid1 * study4) 1 0.01920 2.0129 -439.65
## - I(covid1 * study1) 1 0.02228 2.0160 -439.43
## - I(quiz3 * covid4) 1 0.02301 2.0167 -439.38
## <none> 1.9937 -439.02
## - I(quiz3 * covid3) 1 0.02829 2.0220 -439.00
## - I(study1 * study4) 1 0.03103 2.0247 -438.81
## - I(covid1 * covid2) 1 0.03167 2.0253 -438.77
## - quiz1 1 0.03198 2.0257 -438.74
## - I(covid1 * covid3) 1 0.03323 2.0269 -438.66
## - I(covid2 * study4) 1 0.03424 2.0279 -438.58
## - I(quiz2^2) 1 0.03489 2.0286 -438.54
## - I(covid3^2) 1 0.03749 2.0312 -438.36
## - I(study2 * study3) 1 0.03881 2.0325 -438.26
## - I(quiz3 * study1) 1 0.04033 2.0340 -438.16
## - I(study1^2) 1 0.04084 2.0345 -438.12
## - quiz2 1 0.04151 2.0352 -438.07
## - I(quiz1^2) 1 0.04434 2.0380 -437.87
## - I(quiz2 * study2) 1 0.04445 2.0381 -437.87
## - I(covid3 * study2) 1 0.04662 2.0403 -437.71
## - I(covid4 * study2) 1 0.04767 2.0413 -437.64
## - I(covid1^2) 1 0.04996 2.0436 -437.48
## - I(study2^2) 1 0.05104 2.0447 -437.40
## - I(quiz2 * study3) 1 0.05288 2.0466 -437.28
## - study3 1 0.05446 2.0481 -437.17
## + I(quiz2 * study1) 1 0.00003 1.9936 -437.02
## + I(quiz1 * study3) 1 0.00003 1.9937 -437.02
## + I(study3 * study4) 1 0.00000 1.9937 -437.02
## - I(quiz2 * covid2) 1 0.05802 2.0517 -436.92
## - I(covid2 * covid4) 1 0.05953 2.0532 -436.81
## - I(covid4 * study3) 1 0.06199 2.0557 -436.64
## - I(quiz3^2) 1 0.06468 2.0584 -436.45
## - I(quiz1 * study1) 1 0.06717 2.0608 -436.28

```

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## - I(quiz2 * study4) 1 0.06802 2.0617 -436.22
## - I(quiz4 * covid1) 1 0.07154 2.0652 -435.98
## - study4 1 0.07203 2.0657 -435.94
## - I(quiz1 * covid4) 1 0.08297 2.0766 -435.19
## - I(covid3 * covid4) 1 0.08688 2.0806 -434.92
## - I(study4^2) 1 0.10531 2.0990 -433.66
## - I(covid4^2) 1 0.15357 2.1472 -430.41
## - I(covid1 * covid4) 1 0.15616 2.1498 -430.24
## - study1 1 0.16124 2.1549 -429.90
## - I(covid2 * covid3) 1 0.16330 2.1570 -429.76
## - I(quiz1 * covid1) 1 0.17568 2.1694 -428.94
## - I(quiz1 * quiz2) 1 0.18422 2.1779 -428.38
## - I(quiz1 * covid3) 1 0.18675 2.1804 -428.22
## - I(quiz3 * study3) 1 0.19791 2.1916 -427.49
## - I(quiz4 * covid3) 1 0.21390 2.2076 -426.45
## - covid1 1 0.21923 2.2129 -426.10
## - I(quiz1 * covid2) 1 0.23865 2.2323 -424.85
## - I(quiz3 * quiz4) 1 0.23935 2.2330 -424.81
## - I(covid3 * study3) 1 0.24019 2.2339 -424.75
## - covid3 1 0.25745 2.2511 -423.65
## - quiz3 1 0.26703 2.2607 -423.05
## - I(quiz2 * quiz3) 1 0.26855 2.2622 -422.95
## - covid4 1 0.27311 2.2668 -422.66
## - I(quiz4 * covid2) 1 0.29897 2.2926 -421.04
## - covid2 1 0.34348 2.3372 -418.29
## - I(quiz4 * study1) 1 0.36350 2.3572 -417.07
## - I(quiz4 * study3) 1 0.40689 2.4006 -414.46
## - I(quiz2 * quiz4) 1 0.45928 2.4530 -411.37
## - I(quiz1 * quiz3) 1 0.95127 2.9449 -385.23
## - I(quiz1 * quiz4) 1 1.53521 3.5289 -359.37
##
## Step: AIC=-441
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
## study1 + study2 + study3 + study4 + I(quiz1^2) + I(quiz2^2) +
## I(quiz3^2) + I(covid1^2) + I(covid2^2) + I(covid3^2) + I(covid4^2) +
## I(study1^2) + I(study2^2) + I(study3^2) + I(study4^2) + I(quiz1 *
## quiz2) + I(quiz1 * quiz3) + I(quiz1 * quiz4) + I(quiz1 *
## covid1) + I(quiz1 * covid2) + I(quiz1 * covid3) + I(quiz1 *
## covid4) + I(quiz1 * study1) + I(quiz1 * study2) + I(quiz1 *
## study4) + I(quiz2 * quiz3) + I(quiz2 * quiz4) + I(quiz2 *
## covid1) + I(quiz2 * covid2) + I(quiz2 * covid3) + I(quiz2 *
## covid4) + I(quiz2 * study2) + I(quiz2 * study3) + I(quiz2 *
## study4) + I(quiz3 * quiz4) + I(quiz3 * covid1) + I(quiz3 *
## covid2) + I(quiz3 * covid3) + I(quiz3 * covid4) + I(quiz3 *
## study1) + I(quiz3 * study2) + I(quiz3 * study3) + I(quiz3 *
## study4) + I(quiz4 * covid1) + I(quiz4 * covid2) + I(quiz4 *
## covid3) + I(quiz4 * covid4) + I(quiz4 * study1) + I(quiz4 *
## study2) + I(quiz4 * study3) + I(covid1 * covid2) + I(covid1 *
## covid3) + I(covid1 * covid4) + I(covid1 * study1) + I(covid1 *
## study2) + I(covid1 * study3) + I(covid1 * study4) + I(covid2 *
## covid3) + I(covid2 * covid4) + I(covid2 * study1) + I(covid2 *
## study2) + I(covid2 * study3) + I(covid2 * study4) + I(covid3 *
## covid4) + I(covid3 * study1) + I(covid3 * study2) + I(covid3 *
## study3) + I(covid3 * study4) + I(covid4 * study1) + I(covid4 *

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```

##      study2) + I(covid4 * study3) + I(covid4 * study4) + I(study1 *
##      study2) + I(study1 * study3) + I(study1 * study4) + I(study2 *
##      study3) + I(study2 * study4)
##
##      Df Sum of Sq    RSS    AIC
## - study2          1  0.00036 1.9943 -442.97
## - I(quiz1 * study2) 1  0.00080 1.9948 -442.94
## - I(covid4 * study4) 1  0.00121 1.9952 -442.91
## - I(covid2 * study1) 1  0.00121 1.9952 -442.91
## - I(quiz2 * covid3) 1  0.00141 1.9954 -442.90
## - I(quiz3 * study4) 1  0.00205 1.9960 -442.85
## - I(quiz3 * study2) 1  0.00221 1.9962 -442.84
## - I(covid2^2)       1  0.00225 1.9962 -442.84
## - I(study2 * study4) 1  0.00238 1.9963 -442.83
## - I(covid2 * study2) 1  0.00245 1.9964 -442.82
## - I(quiz4 * covid4) 1  0.00275 1.9967 -442.80
## - I(study3^2)       1  0.00275 1.9967 -442.80
## - I(covid3 * study4) 1  0.00292 1.9969 -442.79
## - I(covid1 * study3) 1  0.00311 1.9971 -442.78
## - I(covid1 * study2) 1  0.00392 1.9979 -442.72
## - I(quiz1 * study4) 1  0.00736 2.0013 -442.47
## - I(quiz2 * covid1) 1  0.00771 2.0017 -442.45
## - I(covid4 * study1) 1  0.00891 2.0029 -442.36
## - I(study1 * study3) 1  0.01075 2.0047 -442.23
## - I(covid3 * study1) 1  0.01080 2.0048 -442.23
## - I(quiz3 * covid2) 1  0.01289 2.0068 -442.08
## - I(study1 * study2) 1  0.01298 2.0069 -442.07
## - I(quiz4 * study2) 1  0.01413 2.0081 -441.99
## - I(quiz3 * covid1) 1  0.01590 2.0099 -441.86
## - I(quiz2 * covid4) 1  0.01621 2.0102 -441.84
## - I(covid2 * study3) 1  0.01737 2.0113 -441.76
## - I(covid1 * study4) 1  0.01893 2.0129 -441.65
## - I(covid1 * study1) 1  0.02280 2.0168 -441.37
## - I(quiz3 * covid4) 1  0.02481 2.0188 -441.23
## <none>              1.9940 -441.00
## - I(quiz3 * covid3) 1  0.02843 2.0224 -440.97
## - I(study1 * study4) 1  0.03156 2.0255 -440.75
## - quiz1            1  0.03174 2.0257 -440.74
## - I(covid1 * covid2) 1  0.03244 2.0264 -440.69
## - I(covid1 * covid3) 1  0.03342 2.0274 -440.62
## - I(covid2 * study4) 1  0.03420 2.0282 -440.57
## - I(quiz2^2)       1  0.03534 2.0293 -440.49
## - I(study2 * study3) 1  0.03856 2.0325 -440.26
## - I(quiz3 * study1) 1  0.04021 2.0342 -440.14
## - quiz2            1  0.04123 2.0352 -440.07
## - I(study1^2)       1  0.04196 2.0359 -440.02
## - I(quiz1^2)        1  0.04409 2.0380 -439.87
## - I(quiz2 * study2) 1  0.04417 2.0381 -439.87
## - I(covid3^2)       1  0.04433 2.0383 -439.86
## - I(covid3 * study2) 1  0.04704 2.0410 -439.67
## - I(covid4 * study2) 1  0.04739 2.0413 -439.64
## - I(study2^2)       1  0.05113 2.0451 -439.38
## - I(covid1^2)       1  0.05124 2.0452 -439.37
## - I(quiz2 * study3) 1  0.05262 2.0466 -439.27

```

```

## + I(quiz4 * study4) 1 0.00028 1.9937 -439.02
## + I(quiz2 * study1) 1 0.00007 1.9939 -439.00
## + I(study3 * study4) 1 0.00003 1.9939 -439.00
## + I(quiz1 * study3) 1 0.00003 1.9939 -439.00
## - I(quiz2 * covid2) 1 0.05773 2.0517 -438.92
## - study3 1 0.05871 2.0527 -438.85
## - I(covid2 * covid4) 1 0.05946 2.0534 -438.80
## - I(covid4 * study3) 1 0.06569 2.0596 -438.36
## - I(quiz3^2) 1 0.06651 2.0605 -438.31
## - I(quiz2 * study4) 1 0.06793 2.0619 -438.21
## - I(quiz1 * study1) 1 0.07018 2.0641 -438.05
## - I(quiz4 * covid1) 1 0.07148 2.0654 -437.96
## - I(quiz1 * covid4) 1 0.08289 2.0769 -437.17
## - study4 1 0.08362 2.0776 -437.12
## - I(covid3 * covid4) 1 0.09173 2.0857 -436.57
## - I(study4^2) 1 0.10594 2.0999 -435.60
## - I(covid4^2) 1 0.15501 2.1490 -432.29
## - I(covid1 * covid4) 1 0.15990 2.1539 -431.97
## - study1 1 0.16245 2.1564 -431.80
## - I(covid2 * covid3) 1 0.17257 2.1665 -431.13
## - I(quiz1 * covid1) 1 0.17570 2.1697 -430.92
## - I(quiz1 * quiz2) 1 0.18496 2.1789 -430.31
## - I(quiz1 * covid3) 1 0.18754 2.1815 -430.14
## - I(quiz3 * study3) 1 0.19819 2.1921 -429.45
## - I(quiz4 * covid3) 1 0.21764 2.2116 -428.19
## - covid1 1 0.21917 2.2131 -428.09
## - I(quiz1 * covid2) 1 0.23911 2.2331 -426.80
## - I(quiz3 * quiz4) 1 0.23947 2.2334 -426.78
## - I(covid3 * study3) 1 0.24046 2.2344 -426.72
## - covid3 1 0.25772 2.2517 -425.62
## - quiz3 1 0.26867 2.2626 -424.92
## - covid4 1 0.27328 2.2672 -424.63
## - I(quiz4 * covid2) 1 0.30145 2.2954 -422.87
## - I(quiz2 * quiz3) 1 0.30150 2.2955 -422.86
## - covid2 1 0.34321 2.3372 -420.29
## - I(quiz4 * study1) 1 0.38018 2.3741 -418.04
## - I(quiz4 * study3) 1 0.44859 2.4425 -413.98
## - I(quiz2 * quiz4) 1 0.52193 2.5159 -409.75
## - I(quiz1 * quiz3) 1 0.97754 2.9715 -385.95
## - I(quiz1 * quiz4) 1 1.68931 3.6833 -355.24
##
## Step: AIC=-442.97
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
## study1 + study3 + study4 + I(quiz1^2) + I(quiz2^2) + I(quiz3^2) +
## I(covid1^2) + I(covid2^2) + I(covid3^2) + I(covid4^2) + I(study1^2) +
## I(study2^2) + I(study3^2) + I(study4^2) + I(quiz1 * quiz2) +
## I(quiz1 * quiz3) + I(quiz1 * quiz4) + I(quiz1 * covid1) +
## I(quiz1 * covid2) + I(quiz1 * covid3) + I(quiz1 * covid4) +
## I(quiz1 * study1) + I(quiz1 * study2) + I(quiz1 * study4) +
## I(quiz2 * quiz3) + I(quiz2 * quiz4) + I(quiz2 * covid1) +
## I(quiz2 * covid2) + I(quiz2 * covid3) + I(quiz2 * covid4) +
## I(quiz2 * study2) + I(quiz2 * study3) + I(quiz2 * study4) +
## I(quiz3 * quiz4) + I(quiz3 * covid1) + I(quiz3 * covid2) +
## I(quiz3 * covid3) + I(quiz3 * covid4) + I(quiz3 * study1) +

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##      I(quiz3 * study2) + I(quiz3 * study3) + I(quiz3 * study4) +
##      I(quiz4 * covid1) + I(quiz4 * covid2) + I(quiz4 * covid3) +
##      I(quiz4 * covid4) + I(quiz4 * study1) + I(quiz4 * study2) +
##      I(quiz4 * study3) + I(covid1 * covid2) + I(covid1 * covid3) +
##      I(covid1 * covid4) + I(covid1 * study1) + I(covid1 * study2) +
##      I(covid1 * study3) + I(covid1 * study4) + I(covid2 * covid3) +
##      I(covid2 * covid4) + I(covid2 * study1) + I(covid2 * study2) +
##      I(covid2 * study3) + I(covid2 * study4) + I(covid3 * covid4) +
##      I(covid3 * study1) + I(covid3 * study2) + I(covid3 * study3) +
##      I(covid3 * study4) + I(covid4 * study1) + I(covid4 * study2) +
##      I(covid4 * study3) + I(covid4 * study4) + I(study1 * study2) +
##      I(study1 * study3) + I(study1 * study4) + I(study2 * study3) +
##      I(study2 * study4)
##
##
##      Df Sum of Sq    RSS    AIC
## - I(quiz1 * study2)    1    0.00048 1.9948 -444.94
## - I(covid4 * study4)    1    0.00128 1.9956 -444.88
## - I(covid2 * study1)    1    0.00145 1.9958 -444.87
## - I(quiz2 * covid3)    1    0.00153 1.9958 -444.86
## - I(quiz3 * study4)    1    0.00203 1.9964 -444.83
## - I(quiz3 * study2)    1    0.00210 1.9964 -444.82
## - I(study2 * study4)    1    0.00222 1.9965 -444.81
## - I(covid2 * study2)    1    0.00231 1.9966 -444.81
## - I(covid2^2)          1    0.00242 1.9967 -444.80
## - I(study3^2)          1    0.00247 1.9968 -444.80
## - I(quiz4 * covid4)    1    0.00281 1.9971 -444.77
## - I(covid3 * study4)    1    0.00288 1.9972 -444.77
## - I(covid1 * study3)    1    0.00320 1.9975 -444.74
## - I(covid1 * study2)    1    0.00428 1.9986 -444.67
## - I(quiz1 * study4)    1    0.00704 2.0014 -444.47
## - I(quiz2 * covid1)    1    0.00743 2.0017 -444.44
## - I(covid4 * study1)    1    0.01005 2.0044 -444.25
## - I(covid3 * study1)    1    0.01118 2.0055 -444.17
## - I(study1 * study3)    1    0.01290 2.0072 -444.05
## - I(quiz3 * covid2)    1    0.01308 2.0074 -444.04
## - I(quiz2 * covid4)    1    0.01586 2.0102 -443.84
## - I(study1 * study2)    1    0.01594 2.0103 -443.83
## - I(quiz3 * covid1)    1    0.01605 2.0104 -443.83
## - I(covid2 * study3)    1    0.01824 2.0126 -443.67
## - I(quiz4 * study2)    1    0.01909 2.0134 -443.61
## - I(covid1 * study4)    1    0.02091 2.0152 -443.48
## - I(covid1 * study1)    1    0.02286 2.0172 -443.34
## - I(quiz3 * covid4)    1    0.02491 2.0192 -443.20
## <none>                  1.9943 -442.97
## - I(quiz3 * covid3)    1    0.02885 2.0232 -442.92
## - I(study1 * study4)    1    0.03122 2.0255 -442.75
## - quiz1                 1    0.03155 2.0259 -442.73
## - I(covid1 * covid2)    1    0.03246 2.0268 -442.66
## - I(covid1 * covid3)    1    0.03326 2.0276 -442.61
## - I(covid2 * study4)    1    0.03477 2.0291 -442.50
## - I(quiz2^2)           1    0.03699 2.0313 -442.34
## - I(study2 * study3)    1    0.03983 2.0342 -442.15
## - I(quiz3 * study1)    1    0.04090 2.0352 -442.07
## - I(study1^2)          1    0.04320 2.0375 -441.91

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## - I(quiz1^2)          1    0.04381 2.0381 -441.87
## - I(covid3^2)         1    0.04417 2.0385 -441.84
## - quiz2               1    0.04457 2.0389 -441.81
## - I(quiz2 * study2)   1    0.04612 2.0404 -441.70
## - I(covid4 * study2)  1    0.04710 2.0414 -441.64
## - I(covid3 * study2)  1    0.04873 2.0431 -441.52
## - I(covid1^2)         1    0.05093 2.0453 -441.37
## - I(quiz2 * study3)   1    0.05227 2.0466 -441.27
## + study2              1    0.00036 1.9940 -441.00
## + I(quiz4 * study4)    1    0.00020 1.9941 -440.99
## + I(quiz2 * study1)    1    0.00017 1.9942 -440.99
## + I(quiz1 * study3)    1    0.00002 1.9943 -440.97
## + I(study3 * study4)   1    0.00000 1.9943 -440.97
## - I(quiz2 * covid2)    1    0.05759 2.0519 -440.90
## - I(covid2 * covid4)   1    0.05959 2.0539 -440.76
## - study3              1    0.06169 2.0560 -440.62
## - I(covid4 * study3)   1    0.06535 2.0597 -440.36
## - I(quiz3^2)           1    0.06634 2.0607 -440.29
## - I(quiz2 * study4)    1    0.06905 2.0634 -440.11
## - I(study2^2)          1    0.07167 2.0660 -439.92
## - I(quiz4 * covid1)    1    0.07185 2.0662 -439.91
## - I(quiz1 * study1)    1    0.08639 2.0807 -438.91
## - I(quiz1 * covid4)    1    0.08673 2.0811 -438.89
## - study4              1    0.08979 2.0841 -438.68
## - I(covid3 * covid4)   1    0.09152 2.0858 -438.56
## - I(study4^2)          1    0.10563 2.0999 -437.59
## - I(covid4^2)          1    0.15492 2.1492 -434.28
## - I(covid1 * covid4)   1    0.15990 2.1542 -433.94
## - I(covid2 * covid3)   1    0.17259 2.1669 -433.10
## - I(quiz1 * covid1)    1    0.17534 2.1697 -432.92
## - I(quiz1 * quiz2)     1    0.18619 2.1805 -432.21
## - I(quiz1 * covid3)    1    0.19245 2.1868 -431.80
## - I(quiz3 * study3)    1    0.19821 2.1925 -431.42
## - I(quiz4 * covid3)    1    0.21728 2.2116 -430.18
## - study1              1    0.22051 2.2148 -429.98
## - covid1              1    0.22103 2.2154 -429.94
## - I(quiz1 * covid2)    1    0.23884 2.2332 -428.80
## - I(quiz3 * quiz4)     1    0.24019 2.2345 -428.71
## - I(covid3 * study3)   1    0.24065 2.2350 -428.68
## - covid3              1    0.27328 2.2676 -426.61
## - quiz3               1    0.27335 2.2677 -426.60
## - covid4              1    0.28360 2.2779 -425.96
## - I(quiz4 * covid2)    1    0.30192 2.2962 -424.81
## - I(quiz2 * quiz3)     1    0.32162 2.3159 -423.59
## - covid2              1    0.34639 2.3407 -422.07
## - I(quiz4 * study1)    1    0.40421 2.3985 -418.58
## - I(quiz4 * study3)    1    0.48563 2.4800 -413.81
## - I(quiz2 * quiz4)     1    0.52531 2.5196 -411.54
## - I(quiz1 * quiz3)     1    1.01130 3.0056 -386.32
## - I(quiz1 * quiz4)     1    1.71823 3.7126 -356.11
##
## Step:  AIC=-444.94
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
##      study1 + study3 + study4 + I(quiz1^2) + I(quiz2^2) + I(quiz3^2) +

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```

##      I(covid1^2) + I(covid2^2) + I(covid3^2) + I(covid4^2) + I(study1^2) +
##      I(study2^2) + I(study3^2) + I(study4^2) + I(quiz1 * quiz2) +
##      I(quiz1 * quiz3) + I(quiz1 * quiz4) + I(quiz1 * covid1) +
##      I(quiz1 * covid2) + I(quiz1 * covid3) + I(quiz1 * covid4) +
##      I(quiz1 * study1) + I(quiz1 * study4) + I(quiz2 * quiz3) +
##      I(quiz2 * quiz4) + I(quiz2 * covid1) + I(quiz2 * covid2) +
##      I(quiz2 * covid3) + I(quiz2 * covid4) + I(quiz2 * study2) +
##      I(quiz2 * study3) + I(quiz2 * study4) + I(quiz3 * quiz4) +
##      I(quiz3 * covid1) + I(quiz3 * covid2) + I(quiz3 * covid3) +
##      I(quiz3 * covid4) + I(quiz3 * study1) + I(quiz3 * study2) +
##      I(quiz3 * study3) + I(quiz3 * study4) + I(quiz4 * covid1) +
##      I(quiz4 * covid2) + I(quiz4 * covid3) + I(quiz4 * covid4) +
##      I(quiz4 * study1) + I(quiz4 * study2) + I(quiz4 * study3) +
##      I(covid1 * covid2) + I(covid1 * covid3) + I(covid1 * covid4) +
##      I(covid1 * study1) + I(covid1 * study2) + I(covid1 * study3) +
##      I(covid1 * study4) + I(covid2 * covid3) + I(covid2 * covid4) +
##      I(covid2 * study1) + I(covid2 * study2) + I(covid2 * study3) +
##      I(covid2 * study4) + I(covid3 * covid4) + I(covid3 * study1) +
##      I(covid3 * study2) + I(covid3 * study3) + I(covid3 * study4) +
##      I(covid4 * study1) + I(covid4 * study2) + I(covid4 * study3) +
##      I(covid4 * study4) + I(study1 * study2) + I(study1 * study3) +
##      I(study1 * study4) + I(study2 * study3) + I(study2 * study4)
##
##      Df Sum of Sq    RSS    AIC
## - I(covid2 * study1)  1    0.00122 1.9960 -446.85
## - I(quiz2 * covid3)   1    0.00158 1.9964 -446.83
## - I(quiz3 * study2)   1    0.00163 1.9964 -446.82
## - I(covid4 * study4)  1    0.00164 1.9964 -446.82
## - I(quiz3 * study4)   1    0.00167 1.9965 -446.82
## - I(study2 * study4)  1    0.00184 1.9966 -446.81
## - I(covid2 * study2)  1    0.00221 1.9970 -446.78
## - I(covid2^2)         1    0.00255 1.9973 -446.76
## - I(study3^2)         1    0.00261 1.9974 -446.75
## - I(covid3 * study4)  1    0.00264 1.9974 -446.75
## - I(covid1 * study3)  1    0.00285 1.9977 -446.73
## - I(quiz4 * covid4)   1    0.00340 1.9982 -446.70
## - I(covid1 * study2)  1    0.00487 1.9997 -446.59
## - I(quiz1 * study4)   1    0.00754 2.0023 -446.40
## - I(quiz2 * covid1)   1    0.00791 2.0027 -446.37
## - I(covid4 * study1)  1    0.00974 2.0045 -446.24
## - I(covid3 * study1)  1    0.01071 2.0055 -446.17
## - I(quiz3 * covid2)   1    0.01389 2.0087 -445.95
## - I(study1 * study3)  1    0.01434 2.0091 -445.91
## - I(study1 * study2)  1    0.01557 2.0104 -445.83
## - I(quiz3 * covid1)   1    0.01595 2.0108 -445.80
## - I(quiz2 * covid4)   1    0.01672 2.0115 -445.75
## - I(covid2 * study3)  1    0.01820 2.0130 -445.64
## - I(quiz4 * study2)   1    0.01878 2.0136 -445.60
## - I(covid1 * study4)  1    0.02161 2.0164 -445.40
## - I(covid1 * study1)  1    0.02386 2.0187 -445.24
## - I(quiz3 * covid4)   1    0.02443 2.0192 -445.20
## <none>                 1.9948 -444.94
## - I(quiz3 * covid3)   1    0.02883 2.0236 -444.89
## - I(study1 * study4)  1    0.03110 2.0259 -444.73

```

```

## - I(covid1 * covid2) 1 0.03316 2.0280 -444.58
## - quiz1 1 0.03328 2.0281 -444.57
## - I(covid2 * study4) 1 0.03573 2.0305 -444.40
## - I(quiz2^2) 1 0.03681 2.0316 -444.32
## - I(covid1 * covid3) 1 0.03803 2.0328 -444.24
## - I(study1^2) 1 0.04344 2.0382 -443.86
## - I(covid3^2) 1 0.04375 2.0386 -443.84
## - quiz2 1 0.04421 2.0390 -443.80
## - I(quiz1^2) 1 0.04449 2.0393 -443.78
## - I(quiz3 * study1) 1 0.04471 2.0395 -443.77
## - I(covid3 * study2) 1 0.04885 2.0436 -443.48
## - I(study2 * study3) 1 0.04920 2.0440 -443.45
## - I(covid4 * study2) 1 0.04973 2.0445 -443.42
## - I(quiz2 * study2) 1 0.05005 2.0449 -443.40
## - I(quiz2 * study3) 1 0.05353 2.0483 -443.15
## + I(quiz1 * study2) 1 0.00048 1.9943 -442.97
## + I(quiz4 * study4) 1 0.00045 1.9943 -442.97
## - I(covid1^2) 1 0.05630 2.0511 -442.96
## + I(quiz1 * study3) 1 0.00023 1.9946 -442.96
## + I(quiz2 * study1) 1 0.00021 1.9946 -442.95
## + I(study3 * study4) 1 0.00006 1.9947 -442.94
## + study2 1 0.00004 1.9948 -442.94
## - I(quiz2 * covid2) 1 0.05936 2.0542 -442.75
## - I(covid2 * covid4) 1 0.06266 2.0575 -442.52
## - study3 1 0.06357 2.0584 -442.45
## - I(quiz3^2) 1 0.06699 2.0618 -442.22
## - I(covid4 * study3) 1 0.06898 2.0638 -442.08
## - I(quiz2 * study4) 1 0.07088 2.0657 -441.95
## - I(study2^2) 1 0.07233 2.0671 -441.85
## - I(quiz4 * covid1) 1 0.07390 2.0687 -441.74
## - I(quiz1 * covid4) 1 0.08817 2.0830 -440.75
## - study4 1 0.08932 2.0841 -440.68
## - I(covid3 * covid4) 1 0.09115 2.0860 -440.55
## - I(study4^2) 1 0.10569 2.1005 -439.56
## - I(covid4^2) 1 0.15457 2.1494 -436.27
## - I(covid1 * covid4) 1 0.16951 2.1643 -435.28
## - I(covid2 * covid3) 1 0.17630 2.1711 -434.83
## - I(quiz1 * covid1) 1 0.17971 2.1745 -434.60
## - I(quiz1 * quiz2) 1 0.18750 2.1823 -434.09
## - I(quiz3 * study3) 1 0.19875 2.1935 -433.36
## - I(quiz1 * study1) 1 0.20913 2.2039 -432.68
## - I(quiz1 * covid3) 1 0.21507 2.2099 -432.30
## - covid1 1 0.22098 2.2158 -431.92
## - I(quiz4 * covid3) 1 0.23023 2.2250 -431.32
## - study1 1 0.23081 2.2256 -431.28
## - I(quiz1 * covid2) 1 0.24216 2.2370 -430.55
## - I(covid3 * study3) 1 0.24458 2.2394 -430.40
## - I(quiz3 * quiz4) 1 0.24491 2.2397 -430.38
## - covid3 1 0.27301 2.2678 -428.60
## - quiz3 1 0.28285 2.2776 -427.98
## - covid4 1 0.28318 2.2780 -427.96
## - I(quiz2 * quiz3) 1 0.32194 2.3167 -425.54
## - I(quiz4 * covid2) 1 0.33236 2.3272 -424.90
## - covid2 1 0.34624 2.3410 -424.05

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```

## - I(quiz4 * study1)    1    0.40958 2.4044 -420.23
## - I(quiz4 * study3)    1    0.51455 2.5094 -414.12
## - I(quiz2 * quiz4)     1    0.53786 2.5327 -412.80
## - I(quiz1 * quiz3)     1    1.01104 3.0058 -388.31
## - I(quiz1 * quiz4)     1    1.73061 3.7254 -357.62
##
## Step:  AIC=-446.85
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
##   study1 + study3 + study4 + I(quiz1^2) + I(quiz2^2) + I(quiz3^2) +
##   I(covid1^2) + I(covid2^2) + I(covid3^2) + I(covid4^2) + I(study1^2) +
##   I(study2^2) + I(study3^2) + I(study4^2) + I(quiz1 * quiz2) +
##   I(quiz1 * quiz3) + I(quiz1 * quiz4) + I(quiz1 * covid1) +
##   I(quiz1 * covid2) + I(quiz1 * covid3) + I(quiz1 * covid4) +
##   I(quiz1 * study1) + I(quiz1 * study4) + I(quiz2 * quiz3) +
##   I(quiz2 * quiz4) + I(quiz2 * covid1) + I(quiz2 * covid2) +
##   I(quiz2 * covid3) + I(quiz2 * covid4) + I(quiz2 * study2) +
##   I(quiz2 * study3) + I(quiz2 * study4) + I(quiz3 * quiz4) +
##   I(quiz3 * covid1) + I(quiz3 * covid2) + I(quiz3 * covid3) +
##   I(quiz3 * covid4) + I(quiz3 * study1) + I(quiz3 * study2) +
##   I(quiz3 * study3) + I(quiz3 * study4) + I(quiz4 * covid1) +
##   I(quiz4 * covid2) + I(quiz4 * covid3) + I(quiz4 * covid4) +
##   I(quiz4 * study1) + I(quiz4 * study2) + I(quiz4 * study3) +
##   I(covid1 * covid2) + I(covid1 * covid3) + I(covid1 * covid4) +
##   I(covid1 * study1) + I(covid1 * study2) + I(covid1 * study3) +
##   I(covid1 * study4) + I(covid2 * covid3) + I(covid2 * covid4) +
##   I(covid2 * study2) + I(covid2 * study3) + I(covid2 * study4) +
##   I(covid3 * covid4) + I(covid3 * study1) + I(covid3 * study2) +
##   I(covid3 * study3) + I(covid3 * study4) + I(covid4 * study1) +
##   I(covid4 * study2) + I(covid4 * study3) + I(covid4 * study4) +
##   I(study1 * study2) + I(study1 * study3) + I(study1 * study4) +
##   I(study2 * study3) + I(study2 * study4)
##
##
##           Df Sum of Sq    RSS    AIC
## - I(covid4 * study4)  1    0.00083 1.9969 -448.79
## - I(quiz2 * covid3)   1    0.00113 1.9972 -448.77
## - I(quiz3 * study4)   1    0.00181 1.9978 -448.72
## - I(covid2 * study2)  1    0.00191 1.9979 -448.71
## - I(quiz3 * study2)   1    0.00229 1.9983 -448.69
## - I(study2 * study4)  1    0.00272 1.9987 -448.66
## - I(covid3 * study4)  1    0.00287 1.9989 -448.65
## - I(quiz4 * covid4)   1    0.00292 1.9989 -448.64
## - I(covid2^2)         1    0.00330 1.9993 -448.61
## - I(study3^2)         1    0.00411 2.0001 -448.56
## - I(covid1 * study3)  1    0.00447 2.0005 -448.53
## - I(covid1 * study2)  1    0.00505 2.0011 -448.49
## - I(quiz2 * covid1)   1    0.00698 2.0030 -448.35
## - I(quiz1 * study4)   1    0.00839 2.0044 -448.25
## - I(covid4 * study1)  1    0.00856 2.0046 -448.24
## - I(covid3 * study1)  1    0.01070 2.0067 -448.09
## - I(study1 * study3)  1    0.01312 2.0091 -447.91
## - I(quiz3 * covid2)   1    0.01332 2.0093 -447.90
## - I(quiz3 * covid1)   1    0.01551 2.0115 -447.74
## - I(covid2 * study3)  1    0.01725 2.0133 -447.62
## - I(quiz4 * study2)   1    0.01766 2.0137 -447.59

```

```

## - I(quiz2 * covid4) 1 0.01991 2.0159 -447.43
## - I(study1 * study2) 1 0.02019 2.0162 -447.41
## - I(covid1 * study4) 1 0.02238 2.0184 -447.26
## - I(quiz3 * covid4) 1 0.02648 2.0225 -446.97
## <none> 1.9960 -446.85
## - I(quiz3 * covid3) 1 0.03008 2.0261 -446.71
## - quiz1 1 0.03224 2.0283 -446.56
## - I(covid1 * covid2) 1 0.03569 2.0317 -446.32
## - I(covid2 * study4) 1 0.03620 2.0322 -446.28
## - I(covid1 * covid3) 1 0.03735 2.0334 -446.20
## - I(quiz2^2) 1 0.04115 2.0372 -445.93
## - I(study1^2) 1 0.04233 2.0384 -445.85
## - I(covid3^2) 1 0.04253 2.0386 -445.84
## - I(quiz3 * study1) 1 0.04370 2.0397 -445.75
## - quiz2 1 0.04592 2.0419 -445.60
## - I(study1 * study4) 1 0.04619 2.0422 -445.58
## - I(quiz1^2) 1 0.04671 2.0427 -445.54
## - I(study2 * study3) 1 0.04806 2.0441 -445.45
## - I(covid3 * study2) 1 0.04863 2.0446 -445.41
## - I(covid4 * study2) 1 0.04982 2.0458 -445.33
## - I(quiz2 * study2) 1 0.05148 2.0475 -445.21
## - I(quiz2 * study3) 1 0.05264 2.0487 -445.13
## + I(covid2 * study1) 1 0.00122 1.9948 -444.94
## - I(covid1^2) 1 0.05565 2.0517 -444.92
## + I(quiz4 * study4) 1 0.00078 1.9952 -444.91
## - I(covid1 * study1) 1 0.05589 2.0519 -444.90
## + I(quiz2 * study1) 1 0.00070 1.9953 -444.90
## + I(quiz1 * study2) 1 0.00025 1.9958 -444.87
## + I(study3 * study4) 1 0.00021 1.9958 -444.87
## + study2 1 0.00018 1.9958 -444.86
## + I(quiz1 * study3) 1 0.00011 1.9959 -444.86
## - study3 1 0.06247 2.0585 -444.44
## - I(quiz2 * covid2) 1 0.06422 2.0602 -444.32
## - I(covid2 * covid4) 1 0.06443 2.0604 -444.31
## - I(quiz3^2) 1 0.06587 2.0619 -444.21
## - I(quiz2 * study4) 1 0.06977 2.0658 -443.94
## - I(covid4 * study3) 1 0.07039 2.0664 -443.90
## - I(study2^2) 1 0.07350 2.0695 -443.68
## - I(quiz4 * covid1) 1 0.07798 2.0740 -443.37
## - I(quiz1 * covid4) 1 0.08814 2.0842 -442.67
## - study4 1 0.08915 2.0852 -442.60
## - I(covid3 * covid4) 1 0.08993 2.0860 -442.55
## - I(study4^2) 1 0.10866 2.1047 -441.27
## - I(covid4^2) 1 0.15349 2.1495 -438.26
## - I(covid1 * covid4) 1 0.17441 2.1704 -436.87
## - I(covid2 * covid3) 1 0.17924 2.1753 -436.55
## - I(quiz1 * covid1) 1 0.17949 2.1755 -436.54
## - I(quiz1 * quiz2) 1 0.18664 2.1827 -436.07
## - I(quiz3 * study3) 1 0.20870 2.2047 -434.63
## - I(quiz1 * covid3) 1 0.21416 2.2102 -434.28
## - I(quiz1 * study1) 1 0.21761 2.2136 -434.05
## - covid1 1 0.21980 2.2158 -433.91
## - I(quiz4 * covid3) 1 0.22913 2.2252 -433.31
## - study1 1 0.22960 2.2256 -433.28

```



```

## - I(quiz1 * covid2)    1    0.24104 2.2371 -432.55
## - I(covid3 * study3)  1    0.24398 2.2400 -432.36
## - I(quiz3 * quiz4)    1    0.25970 2.2557 -431.36
## - covid3              1    0.27496 2.2710 -430.40
## - quiz3               1    0.28442 2.2804 -429.80
## - covid4              1    0.28475 2.2808 -429.78
## - I(quiz2 * quiz3)    1    0.32465 2.3207 -427.30
## - I(quiz4 * covid2)   1    0.34049 2.3365 -426.33
## - covid2              1    0.34654 2.3426 -425.96
## - I(quiz4 * study1)   1    0.48244 2.4785 -417.89
## - I(quiz4 * study3)   1    0.53141 2.5274 -415.10
## - I(quiz2 * quiz4)    1    0.53998 2.5360 -414.61
## - I(quiz1 * quiz3)    1    1.01215 3.0082 -390.20
## - I(quiz1 * quiz4)    1    1.82993 3.8260 -355.81
##
## Step:  AIC=-448.79
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
##   study1 + study3 + study4 + I(quiz1^2) + I(quiz2^2) + I(quiz3^2) +
##   I(covid1^2) + I(covid2^2) + I(covid3^2) + I(covid4^2) + I(study1^2) +
##   I(study2^2) + I(study3^2) + I(study4^2) + I(quiz1 * quiz2) +
##   I(quiz1 * quiz3) + I(quiz1 * quiz4) + I(quiz1 * covid1) +
##   I(quiz1 * covid2) + I(quiz1 * covid3) + I(quiz1 * covid4) +
##   I(quiz1 * study1) + I(quiz1 * study4) + I(quiz2 * quiz3) +
##   I(quiz2 * quiz4) + I(quiz2 * covid1) + I(quiz2 * covid2) +
##   I(quiz2 * covid3) + I(quiz2 * covid4) + I(quiz2 * study2) +
##   I(quiz2 * study3) + I(quiz2 * study4) + I(quiz3 * quiz4) +
##   I(quiz3 * covid1) + I(quiz3 * covid2) + I(quiz3 * covid3) +
##   I(quiz3 * covid4) + I(quiz3 * study1) + I(quiz3 * study2) +
##   I(quiz3 * study3) + I(quiz3 * study4) + I(quiz4 * covid1) +
##   I(quiz4 * covid2) + I(quiz4 * covid3) + I(quiz4 * covid4) +
##   I(quiz4 * study1) + I(quiz4 * study2) + I(quiz4 * study3) +
##   I(covid1 * covid2) + I(covid1 * covid3) + I(covid1 * covid4) +
##   I(covid1 * study1) + I(covid1 * study2) + I(covid1 * study3) +
##   I(covid1 * study4) + I(covid2 * covid3) + I(covid2 * covid4) +
##   I(covid2 * study2) + I(covid2 * study3) + I(covid2 * study4) +
##   I(covid3 * covid4) + I(covid3 * study1) + I(covid3 * study2) +
##   I(covid3 * study3) + I(covid3 * study4) + I(covid4 * study1) +
##   I(covid4 * study2) + I(covid4 * study3) + I(study1 * study2) +
##   I(study1 * study3) + I(study1 * study4) + I(study2 * study3) +
##   I(study2 * study4)
##
##
##           Df Sum of Sq    RSS    AIC
## - I(quiz2 * covid3)    1    0.00112 1.9980 -450.71
## - I(quiz3 * study2)    1    0.00193 1.9988 -450.65
## - I(covid2 * study2)    1    0.00265 1.9995 -450.60
## - I(covid2^2)          1    0.00369 2.0005 -450.53
## - I(quiz3 * study4)    1    0.00393 2.0008 -450.51
## - I(quiz4 * covid4)    1    0.00414 2.0010 -450.50
## - I(study3^2)          1    0.00512 2.0020 -450.43
## - I(study2 * study4)    1    0.00523 2.0021 -450.42
## - I(covid1 * study2)    1    0.00529 2.0021 -450.41
## - I(covid3 * study4)    1    0.00595 2.0028 -450.37
## - I(quiz2 * covid1)    1    0.00627 2.0031 -450.34
## - I(covid1 * study3)    1    0.00731 2.0042 -450.27

```

```

## - I(covid4 * study1) 1 0.00796 2.0048 -450.22
## - I(covid3 * study1) 1 0.00994 2.0068 -450.08
## - I(quiz1 * study4) 1 0.01065 2.0075 -450.03
## - I(study1 * study3) 1 0.01264 2.0095 -449.89
## - I(quiz3 * covid2) 1 0.01298 2.0098 -449.87
## - I(quiz3 * covid1) 1 0.01472 2.0116 -449.74
## - I(covid2 * study3) 1 0.01647 2.0133 -449.62
## - I(study1 * study2) 1 0.01994 2.0168 -449.37
## - I(quiz2 * covid4) 1 0.02010 2.0170 -449.36
## - I(quiz4 * study2) 1 0.02117 2.0180 -449.28
## - I(quiz3 * covid4) 1 0.02659 2.0234 -448.90
## - I(covid1 * study4) 1 0.02703 2.0239 -448.87
## <none> 1.9969 -448.79
## - I(quiz3 * covid3) 1 0.02933 2.0262 -448.71
## - quiz1 1 0.03310 2.0299 -448.44
## - I(covid1 * covid2) 1 0.03520 2.0321 -448.29
## - I(covid2 * study4) 1 0.03660 2.0335 -448.19
## - I(covid1 * covid3) 1 0.03705 2.0339 -448.16
## - I(covid3^2) 1 0.04255 2.0394 -447.78
## - I(study1^2) 1 0.04436 2.0412 -447.65
## - I(quiz1^2) 1 0.04664 2.0435 -447.49
## - I(study2 * study3) 1 0.04730 2.0442 -447.44
## - I(covid3 * study2) 1 0.04780 2.0447 -447.41
## - quiz2 1 0.05056 2.0474 -447.22
## - I(quiz2^2) 1 0.05096 2.0478 -447.19
## - I(quiz2 * study2) 1 0.05243 2.0493 -447.09
## + I(quiz4 * study4) 1 0.00104 1.9958 -446.87
## - I(quiz2 * study3) 1 0.05572 2.0526 -446.86
## + I(covid4 * study4) 1 0.00083 1.9960 -446.85
## + I(quiz1 * study2) 1 0.00053 1.9963 -446.83
## + I(covid2 * study1) 1 0.00041 1.9964 -446.82
## + I(study3 * study4) 1 0.00039 1.9965 -446.82
## + I(quiz1 * study3) 1 0.00023 1.9966 -446.81
## + I(quiz2 * study1) 1 0.00019 1.9967 -446.81
## - I(covid1^2) 1 0.05650 2.0534 -446.80
## + study2 1 0.00009 1.9968 -446.80
## - I(quiz3 * study1) 1 0.06012 2.0570 -446.55
## - I(covid4 * study2) 1 0.06113 2.0580 -446.48
## - study3 1 0.06312 2.0600 -446.34
## - I(quiz2 * covid2) 1 0.06340 2.0603 -446.32
## - I(covid1 * study1) 1 0.06436 2.0612 -446.26
## - I(quiz3^2) 1 0.06515 2.0620 -446.20
## - I(covid2 * covid4) 1 0.06598 2.0628 -446.14
## - I(quiz2 * study4) 1 0.07098 2.0678 -445.80
## - I(study2^2) 1 0.07421 2.0711 -445.57
## - I(quiz4 * covid1) 1 0.07718 2.0740 -445.37
## - I(study1 * study4) 1 0.07868 2.0755 -445.27
## - I(covid4 * study3) 1 0.07896 2.0758 -445.25
## - I(covid3 * covid4) 1 0.08911 2.0860 -444.55
## - study4 1 0.09071 2.0876 -444.44
## - I(quiz1 * covid4) 1 0.10091 2.0978 -443.74
## - I(study4^2) 1 0.10798 2.1048 -443.26
## - I(covid4^2) 1 0.15595 2.1528 -440.04
## - I(covid1 * covid4) 1 0.17385 2.1707 -438.85

```

```

## - I(covid2 * covid3) 1 0.18497 2.1818 -438.12
## - I(quiz1 * quiz2) 1 0.18651 2.1834 -438.02
## - I(quiz3 * study3) 1 0.20792 2.2048 -436.63
## - I(quiz1 * covid3) 1 0.21483 2.2117 -436.18
## - I(quiz1 * covid1) 1 0.22642 2.2233 -435.43
## - study1 1 0.23050 2.2274 -435.17
## - I(quiz4 * covid3) 1 0.23520 2.2321 -434.87
## - covid1 1 0.24366 2.2405 -434.33
## - I(quiz1 * covid2) 1 0.24419 2.2410 -434.29
## - I(covid3 * study3) 1 0.24784 2.2447 -434.06
## - I(quiz1 * study1) 1 0.24845 2.2453 -434.02
## - I(quiz3 * quiz4) 1 0.25950 2.2564 -433.32
## - covid3 1 0.27580 2.2727 -432.29
## - covid4 1 0.28445 2.2813 -431.75
## - quiz3 1 0.30420 2.3011 -430.52
## - I(quiz2 * quiz3) 1 0.32408 2.3209 -429.28
## - I(quiz4 * covid2) 1 0.34341 2.3403 -428.10
## - covid2 1 0.34713 2.3440 -427.87
## - I(quiz4 * study1) 1 0.52960 2.5265 -417.15
## - I(quiz4 * study3) 1 0.53357 2.5304 -416.93
## - I(quiz2 * quiz4) 1 0.54083 2.5377 -416.52
## - I(quiz1 * quiz3) 1 1.03690 3.0338 -390.99
## - I(quiz1 * quiz4) 1 1.83156 3.8284 -357.72
##
## Step: AIC=-450.71
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
## study1 + study3 + study4 + I(quiz1^2) + I(quiz2^2) + I(quiz3^2) +
## I(covid1^2) + I(covid2^2) + I(covid3^2) + I(covid4^2) + I(study1^2) +
## I(study2^2) + I(study3^2) + I(study4^2) + I(quiz1 * quiz2) +
## I(quiz1 * quiz3) + I(quiz1 * quiz4) + I(quiz1 * covid1) +
## I(quiz1 * covid2) + I(quiz1 * covid3) + I(quiz1 * covid4) +
## I(quiz1 * study1) + I(quiz1 * study4) + I(quiz2 * quiz3) +
## I(quiz2 * quiz4) + I(quiz2 * covid1) + I(quiz2 * covid2) +
## I(quiz2 * covid4) + I(quiz2 * study2) + I(quiz2 * study3) +
## I(quiz2 * study4) + I(quiz3 * quiz4) + I(quiz3 * covid1) +
## I(quiz3 * covid2) + I(quiz3 * covid3) + I(quiz3 * covid4) +
## I(quiz3 * study1) + I(quiz3 * study2) + I(quiz3 * study3) +
## I(quiz3 * study4) + I(quiz4 * covid1) + I(quiz4 * covid2) +
## I(quiz4 * covid3) + I(quiz4 * covid4) + I(quiz4 * study1) +
## I(quiz4 * study2) + I(quiz4 * study3) + I(covid1 * covid2) +
## I(covid1 * covid3) + I(covid1 * covid4) + I(covid1 * study1) +
## I(covid1 * study2) + I(covid1 * study3) + I(covid1 * study4) +
## I(covid2 * covid3) + I(covid2 * covid4) + I(covid2 * study2) +
## I(covid2 * study3) + I(covid2 * study4) + I(covid3 * covid4) +
## I(covid3 * study1) + I(covid3 * study2) + I(covid3 * study3) +
## I(covid3 * study4) + I(covid4 * study1) + I(covid4 * study2) +
## I(covid4 * study3) + I(study1 * study2) + I(study1 * study3) +
## I(study1 * study4) + I(study2 * study3) + I(study2 * study4)
##
##
## Df Sum of Sq RSS AIC
## - I(quiz3 * study2) 1 0.00175 1.9997 -452.59
## - I(covid2 * study2) 1 0.00247 2.0004 -452.54
## - I(quiz4 * covid4) 1 0.00430 2.0023 -452.40
## - I(quiz3 * study4) 1 0.00441 2.0024 -452.40

```

```

## - I(study3^2)      1    0.00465 2.0026 -452.38
## - I(covid1 * study2) 1    0.00475 2.0027 -452.37
## - I(covid3 * study4) 1    0.00524 2.0032 -452.34
## - I(quiz2 * covid1)  1    0.00535 2.0033 -452.33
## - I(covid2^2)       1    0.00592 2.0039 -452.29
## - I(covid4 * study1) 1    0.00684 2.0048 -452.22
## - I(covid1 * study3) 1    0.00703 2.0050 -452.21
## - I(study2 * study4) 1    0.00763 2.0056 -452.17
## - I(covid3 * study1) 1    0.00883 2.0068 -452.08
## - I(quiz1 * study4)  1    0.01107 2.0090 -451.92
## - I(study1 * study3) 1    0.01161 2.0096 -451.88
## - I(quiz3 * covid1)  1    0.01481 2.0128 -451.66
## - I(covid2 * study3) 1    0.01888 2.0168 -451.37
## - I(quiz3 * covid2)  1    0.01925 2.0172 -451.34
## - I(quiz2 * covid4)  1    0.01941 2.0174 -451.33
## - I(study1 * study2) 1    0.02000 2.0180 -451.29
## - I(quiz4 * study2)  1    0.02045 2.0184 -451.26
## - I(quiz3 * covid4)  1    0.02679 2.0248 -450.81
## - I(covid1 * study4) 1    0.02730 2.0253 -450.77
## <none>              1.9980 -450.71
## - quiz1              1    0.03200 2.0300 -450.44
## - I(covid1 * covid2) 1    0.03497 2.0329 -450.23
## - I(covid2 * study4) 1    0.03883 2.0368 -449.96
## - I(covid1 * covid3) 1    0.04074 2.0387 -449.82
## - I(covid3^2)        1    0.04210 2.0401 -449.73
## - I(study1^2)        1    0.04396 2.0419 -449.60
## - I(quiz3 * covid3)  1    0.04548 2.0435 -449.49
## - I(covid3 * study2) 1    0.04690 2.0449 -449.39
## - I(study2 * study3) 1    0.04691 2.0449 -449.39
## - I(quiz1^2)         1    0.04798 2.0460 -449.32
## - I(quiz2 * study2)  1    0.05268 2.0507 -448.99
## - quiz2              1    0.05420 2.0522 -448.88
## - I(quiz2 * study3)  1    0.05472 2.0527 -448.85
## + I(quiz4 * study4)  1    0.00112 1.9969 -448.79
## + I(quiz2 * covid3)  1    0.00112 1.9969 -448.79
## + I(covid4 * study4) 1    0.00082 1.9972 -448.77
## + I(quiz1 * study2)  1    0.00062 1.9974 -448.76
## + I(study3 * study4) 1    0.00031 1.9977 -448.73
## + I(quiz1 * study3)  1    0.00030 1.9977 -448.73
## + I(covid2 * study1) 1    0.00020 1.9978 -448.73
## + I(quiz2 * study1)  1    0.00013 1.9978 -448.72
## + study2             1    0.00009 1.9979 -448.72
## - I(quiz2^2)         1    0.05837 2.0563 -448.59
## - I(covid1^2)        1    0.05912 2.0571 -448.54
## - I(covid4 * study2) 1    0.06004 2.0580 -448.48
## - study3            1    0.06216 2.0601 -448.33
## - I(covid1 * study1) 1    0.06355 2.0615 -448.23
## - I(quiz3 * study1)  1    0.06659 2.0646 -448.02
## - I(quiz3^2)         1    0.06692 2.0649 -448.00
## - I(covid2 * covid4) 1    0.06975 2.0677 -447.80
## - I(quiz2 * study4)  1    0.07043 2.0684 -447.76
## - I(study2^2)        1    0.07316 2.0711 -447.57
## - I(covid4 * study3) 1    0.07800 2.0760 -447.24
## - I(quiz4 * covid1)  1    0.07851 2.0765 -447.20

```

```

## - I(covid3 * covid4) 1 0.08827 2.0862 -446.53
## - study4 1 0.08974 2.0877 -446.43
## - I(study1 * study4) 1 0.09873 2.0967 -445.81
## - I(quiz2 * covid2) 1 0.09882 2.0968 -445.81
## - I(quiz1 * covid4) 1 0.10285 2.1008 -445.53
## - I(study4^2) 1 0.10902 2.1070 -445.11
## - I(covid4^2) 1 0.15641 2.1544 -441.93
## - I(covid1 * covid4) 1 0.17578 2.1738 -440.65
## - I(covid2 * covid3) 1 0.18465 2.1826 -440.07
## - I(quiz1 * quiz2) 1 0.18756 2.1855 -439.88
## - I(quiz3 * study3) 1 0.20830 2.2063 -438.53
## - I(quiz1 * covid3) 1 0.21544 2.2134 -438.07
## - I(quiz1 * covid1) 1 0.23014 2.2281 -437.12
## - study1 1 0.23091 2.2289 -437.07
## - I(quiz4 * covid3) 1 0.23851 2.2365 -436.59
## - I(quiz1 * covid2) 1 0.24395 2.2419 -436.24
## - covid1 1 0.24859 2.2466 -435.94
## - I(quiz1 * study1) 1 0.25694 2.2549 -435.41
## - I(quiz3 * quiz4) 1 0.26622 2.2642 -434.82
## - covid4 1 0.29518 2.2932 -433.01
## - covid3 1 0.29826 2.2962 -432.81
## - quiz3 1 0.30312 2.3011 -432.51
## - I(covid3 * study3) 1 0.31834 2.3163 -431.57
## - I(quiz2 * quiz3) 1 0.32664 2.3246 -431.06
## - covid2 1 0.35143 2.3494 -429.54
## - I(quiz4 * covid2) 1 0.35293 2.3509 -429.45
## - I(quiz4 * study1) 1 0.53021 2.5282 -419.05
## - I(quiz4 * study3) 1 0.53271 2.5307 -418.91
## - I(quiz2 * quiz4) 1 0.54493 2.5429 -418.22
## - I(quiz1 * quiz3) 1 1.04851 3.0465 -392.39
## - I(quiz1 * quiz4) 1 1.84449 3.8425 -359.19
##
## Step: AIC=-452.59
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
## study1 + study3 + study4 + I(quiz1^2) + I(quiz2^2) + I(quiz3^2) +
## I(covid1^2) + I(covid2^2) + I(covid3^2) + I(covid4^2) + I(study1^2) +
## I(study2^2) + I(study3^2) + I(study4^2) + I(quiz1 * quiz2) +
## I(quiz1 * quiz3) + I(quiz1 * quiz4) + I(quiz1 * covid1) +
## I(quiz1 * covid2) + I(quiz1 * covid3) + I(quiz1 * covid4) +
## I(quiz1 * study1) + I(quiz1 * study4) + I(quiz2 * quiz3) +
## I(quiz2 * quiz4) + I(quiz2 * covid1) + I(quiz2 * covid2) +
## I(quiz2 * covid4) + I(quiz2 * study2) + I(quiz2 * study3) +
## I(quiz2 * study4) + I(quiz3 * quiz4) + I(quiz3 * covid1) +
## I(quiz3 * covid2) + I(quiz3 * covid3) + I(quiz3 * covid4) +
## I(quiz3 * study1) + I(quiz3 * study3) + I(quiz3 * study4) +
## I(quiz4 * covid1) + I(quiz4 * covid2) + I(quiz4 * covid3) +
## I(quiz4 * covid4) + I(quiz4 * study1) + I(quiz4 * study2) +
## I(quiz4 * study3) + I(covid1 * covid2) + I(covid1 * covid3) +
## I(covid1 * covid4) + I(covid1 * study1) + I(covid1 * study2) +
## I(covid1 * study3) + I(covid1 * study4) + I(covid2 * covid3) +
## I(covid2 * covid4) + I(covid2 * study2) + I(covid2 * study3) +
## I(covid2 * study4) + I(covid3 * covid4) + I(covid3 * study1) +
## I(covid3 * study2) + I(covid3 * study3) + I(covid3 * study4) +
## I(covid4 * study1) + I(covid4 * study2) + I(covid4 * study3) +

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##      I(study1 * study2) + I(study1 * study3) + I(study1 * study4) +
##      I(study2 * study3) + I(study2 * study4)
##
##      Df Sum of Sq    RSS    AIC
## - I(covid2 * study2)  1   0.00183  2.0016 -454.46
## - I(quiz3 * study4)   1   0.00334  2.0031 -454.35
## - I(study3^2)         1   0.00348  2.0032 -454.34
## - I(quiz2 * covid1)   1   0.00503  2.0048 -454.23
## - I(covid3 * study4)  1   0.00526  2.0050 -454.21
## - I(covid1 * study2)  1   0.00527  2.0050 -454.21
## - I(covid2^2)         1   0.00554  2.0053 -454.19
## - I(quiz4 * covid4)   1   0.00564  2.0054 -454.18
## - I(covid1 * study3)  1   0.00571  2.0054 -454.18
## - I(covid4 * study1)  1   0.00640  2.0061 -454.13
## - I(study2 * study4)  1   0.00709  2.0068 -454.08
## - I(covid3 * study1)  1   0.01039  2.0101 -453.85
## - I(quiz1 * study4)   1   0.01077  2.0105 -453.82
## - I(study1 * study3)  1   0.01313  2.0129 -453.65
## - I(quiz3 * covid1)   1   0.01365  2.0134 -453.61
## - I(quiz2 * covid4)   1   0.01909  2.0188 -453.23
## - I(covid2 * study3)  1   0.01911  2.0188 -453.23
## - I(quiz3 * covid2)   1   0.01920  2.0189 -453.22
## - I(study1 * study2)  1   0.02152  2.0212 -453.06
## - I(quiz3 * covid4)   1   0.02522  2.0249 -452.79
## - I(covid1 * study4)  1   0.02711  2.0268 -452.66
## <none>                                1.9997 -452.59
## - quiz1                          1   0.03380  2.0335 -452.19
## - I(covid1 * covid2)  1   0.03917  2.0389 -451.81
## - I(covid2 * study4)  1   0.04190  2.0416 -451.62
## - I(study2 * study3)  1   0.04555  2.0453 -451.37
## - I(quiz3 * covid3)   1   0.04605  2.0458 -451.33
## - I(covid1 * covid3)  1   0.04641  2.0461 -451.31
## - I(study1^2)         1   0.04670  2.0464 -451.29
## - I(covid3^2)         1   0.04673  2.0465 -451.28
## - I(covid3 * study2)  1   0.04928  2.0490 -451.10
## - I(quiz1^2)         1   0.05142  2.0511 -450.96
## - I(quiz2 * study3)   1   0.05457  2.0543 -450.74
## - I(quiz2 * study2)   1   0.05469  2.0544 -450.73
## + I(quiz3 * study2)   1   0.00175  1.9980 -450.71
## + I(quiz2 * covid3)   1   0.00094  1.9988 -450.65
## + I(quiz4 * study4)   1   0.00077  1.9990 -450.64
## + I(covid2 * study1)  1   0.00057  1.9992 -450.63
## + I(covid4 * study4)  1   0.00048  1.9992 -450.62
## + I(quiz1 * study3)   1   0.00046  1.9993 -450.62
## + study2              1   0.00034  1.9994 -450.61
## + I(study3 * study4)  1   0.00012  1.9996 -450.59
## + I(quiz2 * study1)   1   0.00003  1.9997 -450.59
## + I(quiz1 * study2)   1   0.00001  1.9997 -450.59
## - quiz2              1   0.05690  2.0566 -450.57
## - I(covid4 * study2)  1   0.06040  2.0601 -450.33
## - study3             1   0.06052  2.0602 -450.32
## - I(quiz2^2)         1   0.06158  2.0613 -450.25
## - I(covid1 * study1)  1   0.06207  2.0618 -450.22
## - I(quiz3^2)         1   0.06753  2.0673 -449.84

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## - I(quiz4 * study2) 1 0.06871 2.0684 -449.76
## - I(quiz2 * study4) 1 0.06877 2.0685 -449.75
## - I(covid2 * covid4) 1 0.06893 2.0687 -449.74
## - I(quiz3 * study1) 1 0.07108 2.0708 -449.59
## - I(study2^2) 1 0.07222 2.0719 -449.51
## - I(covid1^2) 1 0.07645 2.0762 -449.22
## - I(covid4 * study3) 1 0.07762 2.0773 -449.14
## - I(quiz4 * covid1) 1 0.08116 2.0809 -448.90
## - I(covid3 * covid4) 1 0.09548 2.0952 -447.92
## - I(quiz2 * covid2) 1 0.09709 2.0968 -447.81
## - study4 1 0.09744 2.0972 -447.78
## - I(study1 * study4) 1 0.10481 2.1045 -447.28
## - I(quiz1 * covid4) 1 0.10644 2.1062 -447.17
## - I(study4^2) 1 0.11020 2.1099 -446.92
## - I(covid4^2) 1 0.15788 2.1576 -443.72
## - I(covid1 * covid4) 1 0.18278 2.1825 -442.08
## - I(quiz1 * quiz2) 1 0.19663 2.1964 -441.17
## - I(covid2 * covid3) 1 0.21234 2.2121 -440.16
## - I(quiz1 * covid1) 1 0.22979 2.2295 -439.03
## - study1 1 0.22990 2.2296 -439.02
## - I(quiz1 * covid3) 1 0.23448 2.2342 -438.73
## - I(quiz4 * covid3) 1 0.24593 2.2457 -438.00
## - I(quiz1 * covid2) 1 0.24683 2.2466 -437.94
## - covid1 1 0.25379 2.2535 -437.50
## - I(quiz1 * study1) 1 0.25530 2.2550 -437.40
## - I(quiz3 * study3) 1 0.27294 2.2727 -436.29
## - I(quiz3 * quiz4) 1 0.28770 2.2874 -435.36
## - covid4 1 0.29630 2.2960 -434.83
## - covid3 1 0.30314 2.3029 -434.40
## - I(quiz2 * quiz3) 1 0.32986 2.3296 -432.75
## - I(covid3 * study3) 1 0.33784 2.3376 -432.26
## - quiz3 1 0.35197 2.3517 -431.40
## - covid2 1 0.35356 2.3533 -431.31
## - I(quiz4 * covid2) 1 0.35489 2.3546 -431.22
## - I(quiz2 * quiz4) 1 0.55882 2.5585 -419.35
## - I(quiz4 * study1) 1 0.55955 2.5593 -419.31
## - I(quiz4 * study3) 1 0.68562 2.6853 -412.43
## - I(quiz1 * quiz3) 1 1.05052 3.0502 -394.21
## - I(quiz1 * quiz4) 1 1.84448 3.8442 -361.13
##
## Step: AIC=-454.46
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
## study1 + study3 + study4 + I(quiz1^2) + I(quiz2^2) + I(quiz3^2) +
## I(covid1^2) + I(covid2^2) + I(covid3^2) + I(covid4^2) + I(study1^2) +
## I(study2^2) + I(study3^2) + I(study4^2) + I(quiz1 * quiz2) +
## I(quiz1 * quiz3) + I(quiz1 * quiz4) + I(quiz1 * covid1) +
## I(quiz1 * covid2) + I(quiz1 * covid3) + I(quiz1 * covid4) +
## I(quiz1 * study1) + I(quiz1 * study4) + I(quiz2 * quiz3) +
## I(quiz2 * quiz4) + I(quiz2 * covid1) + I(quiz2 * covid2) +
## I(quiz2 * covid4) + I(quiz2 * study2) + I(quiz2 * study3) +
## I(quiz2 * study4) + I(quiz3 * quiz4) + I(quiz3 * covid1) +
## I(quiz3 * covid2) + I(quiz3 * covid3) + I(quiz3 * covid4) +
## I(quiz3 * study1) + I(quiz3 * study3) + I(quiz3 * study4) +
## I(quiz4 * covid1) + I(quiz4 * covid2) + I(quiz4 * covid3) +

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##      I(quiz4 * covid4) + I(quiz4 * study1) + I(quiz4 * study2) +
##      I(quiz4 * study3) + I(covid1 * covid2) + I(covid1 * covid3) +
##      I(covid1 * covid4) + I(covid1 * study1) + I(covid1 * study2) +
##      I(covid1 * study3) + I(covid1 * study4) + I(covid2 * covid3) +
##      I(covid2 * covid4) + I(covid2 * study3) + I(covid2 * study4) +
##      I(covid3 * covid4) + I(covid3 * study1) + I(covid3 * study2) +
##      I(covid3 * study3) + I(covid3 * study4) + I(covid4 * study1) +
##      I(covid4 * study2) + I(covid4 * study3) + I(study1 * study2) +
##      I(study1 * study3) + I(study1 * study4) + I(study2 * study3) +
##      I(study2 * study4)
##
##
##      Df Sum of Sq    RSS    AIC
## - I(study3^2)      1  0.00312  2.0047 -456.23
## - I(quiz3 * study4) 1  0.00325  2.0048 -456.22
## - I(quiz2 * covid1) 1  0.00405  2.0056 -456.17
## - I(quiz4 * covid4) 1  0.00424  2.0058 -456.15
## - I(covid1 * study3) 1  0.00523  2.0068 -456.08
## - I(covid4 * study1) 1  0.00696  2.0085 -455.96
## - I(covid1 * study2) 1  0.00731  2.0089 -455.93
## - I(covid3 * study4) 1  0.00750  2.0091 -455.92
## - I(study2 * study4) 1  0.00800  2.0096 -455.88
## - I(covid3 * study1) 1  0.00958  2.0111 -455.77
## - I(quiz1 * study4) 1  0.01123  2.0128 -455.66
## - I(covid2^2)      1  0.01137  2.0129 -455.65
## - I(study1 * study3) 1  0.01347  2.0150 -455.50
## - I(quiz3 * covid1) 1  0.01524  2.0168 -455.37
## - I(quiz2 * covid4) 1  0.01827  2.0198 -455.16
## - I(quiz3 * covid2) 1  0.02236  2.0239 -454.87
## - I(study1 * study2) 1  0.02477  2.0263 -454.70
## <none>              2.0016 -454.46
## - I(covid1 * study4) 1  0.02952  2.0311 -454.36
## - I(quiz3 * covid4) 1  0.03047  2.0320 -454.29
## - quiz1             1  0.03442  2.0360 -454.02
## - I(study2 * study3) 1  0.04388  2.0454 -453.35
## - I(covid1 * covid3) 1  0.04485  2.0464 -453.29
## - I(study1^2)       1  0.04554  2.0471 -453.24
## - I(covid3^2)       1  0.04623  2.0478 -453.19
## - I(quiz1^2)        1  0.05017  2.0517 -452.92
## - I(quiz2 * study2) 1  0.05299  2.0545 -452.72
## - I(covid2 * study3) 1  0.05326  2.0548 -452.70
## - I(quiz2 * study3) 1  0.05371  2.0553 -452.67
## + I(covid2 * study2) 1  0.00183  1.9997 -452.59
## + I(quiz3 * study2) 1  0.00112  2.0004 -452.54
## + I(covid4 * study4) 1  0.00102  2.0005 -452.53
## + I(quiz2 * covid3) 1  0.00083  2.0007 -452.51
## + I(quiz4 * study4) 1  0.00066  2.0009 -452.50
## + I(quiz1 * study3) 1  0.00056  2.0010 -452.50
## + I(covid2 * study1) 1  0.00020  2.0014 -452.47
## - I(quiz3 * covid3) 1  0.05658  2.0581 -452.47
## + I(study3 * study4) 1  0.00016  2.0014 -452.47
## + study2            1  0.00015  2.0014 -452.47
## + I(quiz2 * study1) 1  0.00012  2.0014 -452.46
## + I(quiz1 * study2) 1  0.00005  2.0015 -452.46
## - I(covid1 * covid2) 1  0.05688  2.0584 -452.45

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## - I(covid3 * study2) 1 0.05782 2.0594 -452.38
## - study3 1 0.05909 2.0606 -452.29
## - I(covid4 * study2) 1 0.06028 2.0618 -452.21
## - quiz2 1 0.06076 2.0623 -452.18
## - I(covid2 * study4) 1 0.06243 2.0640 -452.06
## - I(quiz2^2) 1 0.06494 2.0665 -451.89
## - I(quiz3^2) 1 0.06593 2.0675 -451.82
## - I(quiz2 * study4) 1 0.06694 2.0685 -451.75
## - I(covid1 * study1) 1 0.06788 2.0694 -451.69
## - I(covid2 * covid4) 1 0.06851 2.0701 -451.64
## - I(quiz4 * study2) 1 0.06861 2.0702 -451.64
## - I(quiz3 * study1) 1 0.07173 2.0733 -451.42
## - I(study2^2) 1 0.07477 2.0763 -451.21
## - I(covid4 * study3) 1 0.08083 2.0824 -450.79
## - I(quiz4 * covid1) 1 0.09221 2.0938 -450.01
## - I(covid1^2) 1 0.09572 2.0973 -449.78
## - study4 1 0.09757 2.0991 -449.65
## - I(quiz2 * covid2) 1 0.09835 2.0999 -449.60
## - I(covid3 * covid4) 1 0.09939 2.1010 -449.52
## - I(quiz1 * covid4) 1 0.10466 2.1062 -449.17
## - I(study1 * study4) 1 0.11085 2.1124 -448.75
## - I(study4^2) 1 0.11434 2.1159 -448.51
## - I(covid4^2) 1 0.15839 2.1600 -445.56
## - I(covid1 * covid4) 1 0.18546 2.1870 -443.78
## - I(quiz1 * quiz2) 1 0.19488 2.1964 -443.17
## - I(covid2 * covid3) 1 0.21307 2.2146 -441.99
## - study1 1 0.22994 2.2315 -440.90
## - I(quiz1 * covid1) 1 0.23383 2.2354 -440.66
## - I(quiz1 * covid3) 1 0.23409 2.2357 -440.64
## - I(quiz1 * covid2) 1 0.24520 2.2468 -439.93
## - I(quiz4 * covid3) 1 0.24746 2.2490 -439.79
## - I(quiz1 * study1) 1 0.25349 2.2551 -439.40
## - covid1 1 0.25574 2.2573 -439.26
## - I(quiz3 * study3) 1 0.28262 2.2842 -437.57
## - covid4 1 0.29755 2.2991 -436.64
## - I(quiz3 * quiz4) 1 0.30427 2.3058 -436.22
## - covid3 1 0.31071 2.3123 -435.82
## - I(quiz2 * quiz3) 1 0.32832 2.3299 -434.73
## - I(quiz4 * covid2) 1 0.35367 2.3552 -433.19
## - quiz3 1 0.35785 2.3594 -432.93
## - covid2 1 0.37675 2.3783 -431.79
## - I(covid3 * study3) 1 0.45943 2.4610 -426.91
## - I(quiz2 * quiz4) 1 0.56733 2.5689 -420.77
## - I(quiz4 * study1) 1 0.57501 2.5766 -420.34
## - I(quiz4 * study3) 1 0.68504 2.6866 -414.36
## - I(quiz1 * quiz3) 1 1.05033 3.0519 -396.13
## - I(quiz1 * quiz4) 1 1.84376 3.8453 -363.09
##
## Step: AIC=-456.23
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
## study1 + study3 + study4 + I(quiz1^2) + I(quiz2^2) + I(quiz3^2) +
## I(covid1^2) + I(covid2^2) + I(covid3^2) + I(covid4^2) + I(study1^2) +
## I(study2^2) + I(study4^2) + I(quiz1 * quiz2) + I(quiz1 *
## quiz3) + I(quiz1 * quiz4) + I(quiz1 * covid1) + I(quiz1 *

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## covid2) + I(quiz1 * covid3) + I(quiz1 * covid4) + I(quiz1 *
## study1) + I(quiz1 * study4) + I(quiz2 * quiz3) + I(quiz2 *
## quiz4) + I(quiz2 * covid1) + I(quiz2 * covid2) + I(quiz2 *
## covid4) + I(quiz2 * study2) + I(quiz2 * study3) + I(quiz2 *
## study4) + I(quiz3 * quiz4) + I(quiz3 * covid1) + I(quiz3 *
## covid2) + I(quiz3 * covid3) + I(quiz3 * covid4) + I(quiz3 *
## study1) + I(quiz3 * study3) + I(quiz3 * study4) + I(quiz4 *
## covid1) + I(quiz4 * covid2) + I(quiz4 * covid3) + I(quiz4 *
## covid4) + I(quiz4 * study1) + I(quiz4 * study2) + I(quiz4 *
## study3) + I(covid1 * covid2) + I(covid1 * covid3) + I(covid1 *
## covid4) + I(covid1 * study1) + I(covid1 * study2) + I(covid1 *
## study3) + I(covid1 * study4) + I(covid2 * covid3) + I(covid2 *
## covid4) + I(covid2 * study3) + I(covid2 * study4) + I(covid3 *
## covid4) + I(covid3 * study1) + I(covid3 * study2) + I(covid3 *
## study3) + I(covid3 * study4) + I(covid4 * study1) + I(covid4 *
## study2) + I(covid4 * study3) + I(study1 * study2) + I(study1 *
## study3) + I(study1 * study4) + I(study2 * study3) + I(study2 *
## study4)
##
##
## Df Sum of Sq RSS AIC
## - I(quiz2 * covid1) 1 0.00375 2.0084 -457.97
## - I(covid1 * study3) 1 0.00399 2.0087 -457.95
## - I(quiz4 * covid4) 1 0.00522 2.0099 -457.86
## - I(covid4 * study1) 1 0.00612 2.0108 -457.80
## - I(quiz3 * study4) 1 0.00689 2.0116 -457.74
## - I(covid1 * study2) 1 0.00695 2.0116 -457.74
## - I(covid3 * study4) 1 0.00756 2.0122 -457.69
## - I(study2 * study4) 1 0.00963 2.0143 -457.55
## - I(covid2^2) 1 0.01072 2.0154 -457.47
## - I(covid3 * study1) 1 0.01208 2.0168 -457.37
## - I(quiz1 * study4) 1 0.01299 2.0177 -457.31
## - I(quiz3 * covid1) 1 0.01480 2.0195 -457.18
## - I(quiz2 * covid4) 1 0.01596 2.0206 -457.10
## - I(study1 * study3) 1 0.02386 2.0285 -456.54
## - I(quiz3 * covid2) 1 0.02691 2.0316 -456.33
## - I(study1 * study2) 1 0.02754 2.0322 -456.28
## - I(quiz3 * covid4) 1 0.02768 2.0324 -456.27
## <none> 2.0047 -456.23
## - I(covid1 * study4) 1 0.02844 2.0331 -456.22
## - I(study2 * study3) 1 0.04139 2.0461 -455.31
## - quiz1 1 0.04386 2.0485 -455.14
## - I(covid3^2) 1 0.04781 2.0525 -454.86
## - I(covid1 * covid3) 1 0.05215 2.0568 -454.56
## - I(quiz1^2) 1 0.05254 2.0572 -454.53
## + I(study3^2) 1 0.00312 2.0016 -454.46
## + I(study3 * study4) 1 0.00224 2.0024 -454.39
## - I(covid2 * study3) 1 0.05484 2.0595 -454.37
## + I(covid4 * study4) 1 0.00191 2.0028 -454.37
## + I(covid2 * study2) 1 0.00147 2.0032 -454.34
## + I(quiz4 * study4) 1 0.00066 2.0040 -454.28
## + I(quiz2 * covid3) 1 0.00054 2.0041 -454.27
## + I(covid2 * study1) 1 0.00054 2.0041 -454.27
## + I(quiz2 * study1) 1 0.00044 2.0042 -454.26
## + I(quiz1 * study3) 1 0.00036 2.0043 -454.26

```

```

## + I(quiz3 * study2) 1 0.00032 2.0044 -454.26
## + I(quiz1 * study2) 1 0.00028 2.0044 -454.25
## + study2 1 0.00000 2.0047 -454.23
## - I(study1^2) 1 0.05713 2.0618 -454.21
## - study3 1 0.05773 2.0624 -454.17
## - I(covid1 * covid2) 1 0.05820 2.0629 -454.14
## - I(covid3 * study2) 1 0.06068 2.0654 -453.97
## - I(quiz3 * covid3) 1 0.06091 2.0656 -453.95
## - I(covid4 * study2) 1 0.06126 2.0659 -453.93
## - I(quiz2 * study2) 1 0.06181 2.0665 -453.89
## - I(quiz2 * study3) 1 0.06222 2.0669 -453.86
## - I(covid2 * study4) 1 0.06319 2.0679 -453.79
## - quiz2 1 0.06366 2.0683 -453.76
## - I(quiz2 * study4) 1 0.06417 2.0688 -453.73
## - I(quiz3^2) 1 0.06430 2.0690 -453.72
## - I(covid1 * study1) 1 0.06477 2.0694 -453.69
## - I(quiz2^2) 1 0.06695 2.0716 -453.54
## - I(covid2 * covid4) 1 0.06718 2.0719 -453.52
## - I(quiz4 * study2) 1 0.06756 2.0722 -453.49
## - I(study2^2) 1 0.07563 2.0803 -452.94
## - I(covid4 * study3) 1 0.08232 2.0870 -452.48
## - I(quiz3 * study1) 1 0.09230 2.0970 -451.80
## - study4 1 0.09446 2.0991 -451.65
## - I(quiz2 * covid2) 1 0.09530 2.1000 -451.59
## - I(covid3 * covid4) 1 0.09662 2.1013 -451.50
## - I(quiz4 * covid1) 1 0.09892 2.1036 -451.35
## - I(covid1^2) 1 0.11068 2.1154 -450.55
## - I(study1 * study4) 1 0.11183 2.1165 -450.47
## - I(quiz1 * covid4) 1 0.12200 2.1267 -449.78
## - I(study4^2) 1 0.14159 2.1463 -448.47
## - I(covid4^2) 1 0.15617 2.1608 -447.51
## - I(covid1 * covid4) 1 0.18900 2.1937 -445.35
## - I(quiz1 * quiz2) 1 0.19178 2.1965 -445.17
## - I(covid2 * covid3) 1 0.21785 2.2225 -443.48
## - study1 1 0.22749 2.2322 -442.86
## - I(quiz1 * covid1) 1 0.23071 2.2354 -442.66
## - I(quiz1 * covid3) 1 0.23515 2.2398 -442.37
## - I(quiz1 * covid2) 1 0.24627 2.2509 -441.66
## - I(quiz4 * covid3) 1 0.24915 2.2538 -441.48
## - covid1 1 0.25926 2.2639 -440.84
## - I(quiz1 * study1) 1 0.27036 2.2750 -440.14
## - I(quiz3 * study3) 1 0.28269 2.2874 -439.37
## - covid4 1 0.29496 2.2996 -438.60
## - I(quiz3 * quiz4) 1 0.30126 2.3059 -438.21
## - covid3 1 0.31235 2.3170 -437.53
## - I(quiz2 * quiz3) 1 0.32521 2.3299 -436.73
## - quiz3 1 0.36522 2.3699 -434.30
## - covid2 1 0.37386 2.3785 -433.78
## - I(quiz4 * covid2) 1 0.37901 2.3837 -433.47
## - I(covid3 * study3) 1 0.48567 2.4903 -427.21
## - I(quiz2 * quiz4) 1 0.56764 2.5723 -422.58
## - I(quiz4 * study1) 1 0.62250 2.6272 -419.56
## - I(quiz4 * study3) 1 0.70603 2.7107 -415.09
## - I(quiz1 * quiz3) 1 1.05527 3.0600 -397.76

```

```

## - I(quiz1 * quiz4)      1    2.01478 4.0195 -358.75
##
## Step:  AIC=-457.97
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
##      study1 + study3 + study4 + I(quiz1^2) + I(quiz2^2) + I(quiz3^2) +
##      I(covid1^2) + I(covid2^2) + I(covid3^2) + I(covid4^2) + I(study1^2) +
##      I(study2^2) + I(study4^2) + I(quiz1 * quiz2) + I(quiz1 *
##      quiz3) + I(quiz1 * quiz4) + I(quiz1 * covid1) + I(quiz1 *
##      covid2) + I(quiz1 * covid3) + I(quiz1 * covid4) + I(quiz1 *
##      study1) + I(quiz1 * study4) + I(quiz2 * quiz3) + I(quiz2 *
##      quiz4) + I(quiz2 * covid2) + I(quiz2 * covid4) + I(quiz2 *
##      study2) + I(quiz2 * study3) + I(quiz2 * study4) + I(quiz3 *
##      quiz4) + I(quiz3 * covid1) + I(quiz3 * covid2) + I(quiz3 *
##      covid3) + I(quiz3 * covid4) + I(quiz3 * study1) + I(quiz3 *
##      study3) + I(quiz3 * study4) + I(quiz4 * covid1) + I(quiz4 *
##      covid2) + I(quiz4 * covid3) + I(quiz4 * covid4) + I(quiz4 *
##      study1) + I(quiz4 * study2) + I(quiz4 * study3) + I(covid1 *
##      covid2) + I(covid1 * covid3) + I(covid1 * covid4) + I(covid1 *
##      study1) + I(covid1 * study2) + I(covid1 * study3) + I(covid1 *
##      study4) + I(covid2 * covid3) + I(covid2 * covid4) + I(covid2 *
##      study3) + I(covid2 * study4) + I(covid3 * covid4) + I(covid3 *
##      study1) + I(covid3 * study2) + I(covid3 * study3) + I(covid3 *
##      study4) + I(covid4 * study1) + I(covid4 * study2) + I(covid4 *
##      study3) + I(study1 * study2) + I(study1 * study3) + I(study1 *
##      study4) + I(study2 * study3) + I(study2 * study4)
##
##
##      Df Sum of Sq    RSS    AIC
## - I(quiz4 * covid4)      1    0.00445 2.0129 -459.65
## - I(covid4 * study1)     1    0.00598 2.0144 -459.54
## - I(quiz3 * study4)      1    0.00697 2.0154 -459.47
## - I(covid1 * study2)     1    0.00761 2.0160 -459.42
## - I(covid3 * study1)     1    0.00989 2.0183 -459.26
## - I(quiz1 * study4)      1    0.01071 2.0191 -459.20
## - I(quiz3 * covid1)      1    0.01160 2.0200 -459.14
## - I(study2 * study4)     1    0.01166 2.0201 -459.14
## - I(covid3 * study4)     1    0.01273 2.0212 -459.06
## - I(covid1 * study3)     1    0.01566 2.0241 -458.85
## - I(covid2^2)            1    0.01654 2.0250 -458.79
## - I(quiz2 * covid4)      1    0.02049 2.0289 -458.51
## - I(study1 * study3)     1    0.02149 2.0299 -458.44
## - I(quiz3 * covid2)      1    0.02389 2.0323 -458.27
## - I(quiz3 * covid4)      1    0.02485 2.0333 -458.21
## - I(study1 * study2)     1    0.02813 2.0366 -457.98
## <none>                    2.0084 -457.97
## - I(study2 * study3)     1    0.03795 2.0464 -457.29
## - quiz1                  1    0.04012 2.0485 -457.14
## - I(covid3^2)            1    0.04422 2.0526 -456.85
## - I(quiz1^2)             1    0.04897 2.0574 -456.52
## + I(quiz2 * covid1)      1    0.00375 2.0047 -456.23
## - I(covid2 * study3)     1    0.05324 2.0617 -456.22
## - I(study1^2)            1    0.05342 2.0618 -456.21
## + I(study3^2)            1    0.00282 2.0056 -456.17
## + I(study3 * study4)     1    0.00140 2.0070 -456.07
## - study3                 1    0.05573 2.0642 -456.05

```

```

## + I(covid4 * study4) 1 0.00071 2.0077 -456.02
## + I(covid2 * study2) 1 0.00066 2.0078 -456.01
## + I(quiz4 * study4) 1 0.00061 2.0078 -456.01
## + I(covid2 * study1) 1 0.00043 2.0080 -456.00
## + I(quiz1 * study2) 1 0.00041 2.0080 -455.99
## + I(quiz2 * study1) 1 0.00040 2.0080 -455.99
## + I(quiz3 * study2) 1 0.00031 2.0081 -455.99
## + I(quiz1 * study3) 1 0.00018 2.0082 -455.98
## + study2 1 0.00009 2.0083 -455.97
## + I(quiz2 * covid3) 1 0.00006 2.0084 -455.97
## - I(quiz3 * covid3) 1 0.05717 2.0656 -455.95
## - I(covid1 * covid3) 1 0.05721 2.0656 -455.95
## - I(covid3 * study2) 1 0.05843 2.0669 -455.86
## - I(quiz2 * study2) 1 0.05855 2.0670 -455.86
## - I(quiz2 * study3) 1 0.05960 2.0680 -455.78
## - I(covid4 * study2) 1 0.05981 2.0682 -455.77
## - I(covid1 * study4) 1 0.05982 2.0682 -455.77
## - I(quiz2 * study4) 1 0.06110 2.0695 -455.68
## - I(covid2 * covid4) 1 0.06472 2.0731 -455.43
## - I(quiz4 * study2) 1 0.06523 2.0737 -455.39
## - I(quiz3^2) 1 0.07267 2.0811 -454.88
## - I(study2^2) 1 0.07288 2.0813 -454.87
## - quiz2 1 0.07357 2.0820 -454.82
## - I(covid1 * study1) 1 0.07418 2.0826 -454.78
## - I(covid1 * covid2) 1 0.07427 2.0827 -454.77
## - I(quiz2^2) 1 0.08085 2.0893 -454.32
## - I(covid4 * study3) 1 0.08427 2.0927 -454.09
## - study4 1 0.09176 2.1002 -453.58
## - I(covid3 * covid4) 1 0.09297 2.1014 -453.49
## - I(quiz3 * study1) 1 0.10054 2.1090 -452.98
## - I(quiz4 * covid1) 1 0.10071 2.1091 -452.97
## - I(quiz2 * covid2) 1 0.10929 2.1177 -452.39
## - I(study1 * study4) 1 0.11289 2.1213 -452.15
## - I(covid2 * study4) 1 0.12123 2.1297 -451.58
## - I(quiz1 * covid4) 1 0.12131 2.1297 -451.58
## - I(study4^2) 1 0.14072 2.1491 -450.28
## - I(covid1^2) 1 0.14226 2.1507 -450.18
## - I(covid4^2) 1 0.17091 2.1793 -448.29
## - I(quiz1 * quiz2) 1 0.19778 2.2062 -446.53
## - I(covid1 * covid4) 1 0.20707 2.2155 -445.93
## - I(covid2 * covid3) 1 0.21793 2.2264 -445.23
## - study1 1 0.22529 2.2337 -444.76
## - I(quiz1 * covid3) 1 0.23166 2.2401 -444.36
## - I(quiz4 * covid3) 1 0.24582 2.2542 -443.45
## - I(quiz1 * covid1) 1 0.25086 2.2593 -443.14
## - covid1 1 0.25552 2.2639 -442.84
## - I(quiz1 * study1) 1 0.26740 2.2758 -442.09
## - I(quiz1 * covid2) 1 0.27673 2.2852 -441.51
## - I(quiz3 * study3) 1 0.28779 2.2962 -440.82
## - covid4 1 0.30166 2.3101 -439.96
## - covid3 1 0.31021 2.3186 -439.43
## - I(quiz2 * quiz3) 1 0.33565 2.3441 -437.87
## - I(quiz3 * quiz4) 1 0.34838 2.3568 -437.09
## - quiz3 1 0.36812 2.3766 -435.90

```

```

## - covid2          1    0.37129 2.3797 -435.71
## - I(quiz4 * covid2) 1    0.37794 2.3864 -435.31
## - I(covid3 * study3) 1    0.48350 2.4919 -429.12
## - I(quiz2 * quiz4) 1    0.56389 2.5723 -424.58
## - I(quiz4 * study1) 1    0.62515 2.6336 -421.21
## - I(quiz4 * study3) 1    0.70432 2.7127 -416.98
## - I(quiz1 * quiz3) 1    1.11473 3.1232 -396.83
## - I(quiz1 * quiz4) 1    2.02195 4.0304 -360.36
##
## Step: AIC=-459.65
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
## study1 + study3 + study4 + I(quiz1^2) + I(quiz2^2) + I(quiz3^2) +
## I(covid1^2) + I(covid2^2) + I(covid3^2) + I(covid4^2) + I(study1^2) +
## I(study2^2) + I(study4^2) + I(quiz1 * quiz2) + I(quiz1 *
## quiz3) + I(quiz1 * quiz4) + I(quiz1 * covid1) + I(quiz1 *
## covid2) + I(quiz1 * covid3) + I(quiz1 * covid4) + I(quiz1 *
## study1) + I(quiz1 * study4) + I(quiz2 * quiz3) + I(quiz2 *
## quiz4) + I(quiz2 * covid2) + I(quiz2 * covid4) + I(quiz2 *
## study2) + I(quiz2 * study3) + I(quiz2 * study4) + I(quiz3 *
## quiz4) + I(quiz3 * covid1) + I(quiz3 * covid2) + I(quiz3 *
## covid3) + I(quiz3 * covid4) + I(quiz3 * study1) + I(quiz3 *
## study3) + I(quiz3 * study4) + I(quiz4 * covid1) + I(quiz4 *
## covid2) + I(quiz4 * covid3) + I(quiz4 * study1) + I(quiz4 *
## study2) + I(quiz4 * study3) + I(covid1 * covid2) + I(covid1 *
## covid3) + I(covid1 * covid4) + I(covid1 * study1) + I(covid1 *
## study2) + I(covid1 * study3) + I(covid1 * study4) + I(covid2 *
## covid3) + I(covid2 * covid4) + I(covid2 * study3) + I(covid2 *
## study4) + I(covid3 * covid4) + I(covid3 * study1) + I(covid3 *
## study2) + I(covid3 * study3) + I(covid3 * study4) + I(covid4 *
## study1) + I(covid4 * study2) + I(covid4 * study3) + I(study1 *
## study2) + I(study1 * study3) + I(study1 * study4) + I(study2 *
## study3) + I(study2 * study4)
##
##
## Df Sum of Sq RSS AIC
## - I(quiz3 * study4) 1 0.00554 2.0184 -461.26
## - I(covid1 * study2) 1 0.00615 2.0190 -461.21
## - I(covid3 * study1) 1 0.00862 2.0215 -461.04
## - I(covid4 * study1) 1 0.01066 2.0235 -460.89
## - I(study2 * study4) 1 0.01231 2.0252 -460.78
## - I(quiz1 * study4) 1 0.01348 2.0264 -460.69
## - I(quiz3 * covid1) 1 0.01364 2.0265 -460.68
## - I(covid3 * study4) 1 0.01384 2.0267 -460.67
## - I(covid2^2) 1 0.01429 2.0272 -460.64
## - I(covid1 * study3) 1 0.02132 2.0342 -460.14
## - I(study1 * study3) 1 0.02246 2.0353 -460.06
## - I(quiz3 * covid2) 1 0.02266 2.0355 -460.05
## - I(quiz2 * covid4) 1 0.02443 2.0373 -459.92
## - I(study1 * study2) 1 0.02577 2.0387 -459.83
## <none> 2.0129 -459.65
## - I(study2 * study3) 1 0.03697 2.0498 -459.05
## - quiz1 1 0.04347 2.0564 -458.59
## - I(quiz1^2) 1 0.04637 2.0593 -458.39
## - I(covid3^2) 1 0.05047 2.0633 -458.11
## - I(covid2 * study3) 1 0.05084 2.0637 -458.08

```

```

## + I(quiz4 * covid4) 1 0.00445 2.0084 -457.97
## - I(quiz3 * covid4) 1 0.05273 2.0656 -457.95
## + I(study3^2) 1 0.00371 2.0092 -457.91
## + I(quiz2 * covid1) 1 0.00298 2.0099 -457.86
## - study3 1 0.05461 2.0675 -457.82
## + I(study3 * study4) 1 0.00206 2.0108 -457.80
## + I(covid4 * study4) 1 0.00163 2.0112 -457.76
## - I(covid1 * covid3) 1 0.05545 2.0683 -457.76
## - I(covid1 * study4) 1 0.05582 2.0687 -457.74
## + I(quiz3 * study2) 1 0.00101 2.0119 -457.72
## + I(quiz1 * study2) 1 0.00095 2.0119 -457.72
## + I(quiz4 * study4) 1 0.00029 2.0126 -457.67
## - I(quiz2 * study2) 1 0.05687 2.0697 -457.66
## + study2 1 0.00018 2.0127 -457.66
## + I(covid2 * study1) 1 0.00017 2.0127 -457.66
## + I(quiz2 * study1) 1 0.00017 2.0127 -457.66
## + I(quiz1 * study3) 1 0.00013 2.0127 -457.66
## + I(quiz2 * covid3) 1 0.00012 2.0128 -457.66
## + I(covid2 * study2) 1 0.00002 2.0129 -457.65
## - I(quiz2 * study4) 1 0.05714 2.0700 -457.65
## - I(study1^2) 1 0.05739 2.0703 -457.63
## - I(quiz2 * study3) 1 0.05855 2.0714 -457.55
## - I(covid4 * study2) 1 0.06056 2.0734 -457.41
## - I(covid3 * study2) 1 0.06256 2.0754 -457.27
## - I(quiz4 * study2) 1 0.06354 2.0764 -457.21
## - I(covid2 * covid4) 1 0.06677 2.0796 -456.98
## - I(quiz3^2) 1 0.06824 2.0811 -456.88
## - I(study2^2) 1 0.06989 2.0828 -456.77
## - I(quiz3 * covid3) 1 0.07137 2.0842 -456.67
## - I(covid1 * covid2) 1 0.07525 2.0881 -456.40
## - quiz2 1 0.07838 2.0913 -456.19
## - I(quiz2^2) 1 0.08316 2.0960 -455.86
## - I(covid4 * study3) 1 0.08373 2.0966 -455.82
## - I(covid3 * covid4) 1 0.09071 2.1036 -455.35
## - study4 1 0.09464 2.1075 -455.08
## - I(covid1 * study1) 1 0.09487 2.1077 -455.06
## - I(quiz3 * study1) 1 0.10377 2.1166 -454.46
## - I(quiz2 * covid2) 1 0.10792 2.1208 -454.18
## - I(study1 * study4) 1 0.10918 2.1221 -454.10
## - I(quiz4 * covid1) 1 0.11084 2.1237 -453.98
## - I(covid2 * study4) 1 0.11955 2.1324 -453.40
## - I(quiz1 * covid4) 1 0.12341 2.1363 -453.14
## - I(covid1^2) 1 0.13973 2.1526 -452.05
## - I(study4^2) 1 0.14310 2.1560 -451.83
## - I(covid4^2) 1 0.16661 2.1795 -450.28
## - I(quiz1 * quiz2) 1 0.19364 2.2065 -448.51
## - study1 1 0.22290 2.2358 -446.63
## - I(covid1 * covid4) 1 0.22310 2.2360 -446.62
## - I(covid2 * covid3) 1 0.22536 2.2382 -446.47
## - I(quiz1 * covid3) 1 0.23140 2.2443 -446.09
## - I(quiz1 * covid1) 1 0.25541 2.2683 -444.57
## - covid1 1 0.25902 2.2719 -444.34
## - I(quiz1 * study1) 1 0.27068 2.2836 -443.61
## - I(quiz1 * covid2) 1 0.27238 2.2853 -443.50

```

```

## - I(quiz3 * study3) 1 0.30060 2.3135 -441.74
## - covid4 1 0.30260 2.3155 -441.62
## - covid3 1 0.31789 2.3308 -440.68
## - I(quiz2 * quiz3) 1 0.33128 2.3442 -439.86
## - quiz3 1 0.36427 2.3771 -437.86
## - covid2 1 0.36699 2.3799 -437.70
## - I(quiz4 * covid2) 1 0.37355 2.3864 -437.31
## - I(quiz4 * covid3) 1 0.40079 2.4137 -435.68
## - I(quiz3 * quiz4) 1 0.41563 2.4285 -434.81
## - I(covid3 * study3) 1 0.55195 2.5648 -427.00
## - I(quiz2 * quiz4) 1 0.57479 2.5877 -425.73
## - I(quiz4 * study1) 1 0.62336 2.6362 -423.07
## - I(quiz4 * study3) 1 0.71562 2.7285 -418.15
## - I(quiz1 * quiz3) 1 1.12521 3.1381 -398.15
## - I(quiz1 * quiz4) 1 2.02775 4.0406 -362.00
##
## Step: AIC=-461.26
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
## study1 + study3 + study4 + I(quiz1^2) + I(quiz2^2) + I(quiz3^2) +
## I(covid1^2) + I(covid2^2) + I(covid3^2) + I(covid4^2) + I(study1^2) +
## I(study2^2) + I(study4^2) + I(quiz1 * quiz2) + I(quiz1 *
## quiz3) + I(quiz1 * quiz4) + I(quiz1 * covid1) + I(quiz1 *
## covid2) + I(quiz1 * covid3) + I(quiz1 * covid4) + I(quiz1 *
## study1) + I(quiz1 * study4) + I(quiz2 * quiz3) + I(quiz2 *
## quiz4) + I(quiz2 * covid2) + I(quiz2 * covid4) + I(quiz2 *
## study2) + I(quiz2 * study3) + I(quiz2 * study4) + I(quiz3 *
## quiz4) + I(quiz3 * covid1) + I(quiz3 * covid2) + I(quiz3 *
## covid3) + I(quiz3 * covid4) + I(quiz3 * study1) + I(quiz3 *
## study3) + I(quiz4 * covid1) + I(quiz4 * covid2) + I(quiz4 *
## covid3) + I(quiz4 * study1) + I(quiz4 * study2) + I(quiz4 *
## study3) + I(covid1 * covid2) + I(covid1 * covid3) + I(covid1 *
## covid4) + I(covid1 * study1) + I(covid1 * study2) + I(covid1 *
## study3) + I(covid1 * study4) + I(covid2 * covid3) + I(covid2 *
## covid4) + I(covid2 * study3) + I(covid2 * study4) + I(covid3 *
## covid4) + I(covid3 * study1) + I(covid3 * study2) + I(covid3 *
## study3) + I(covid3 * study4) + I(covid4 * study1) + I(covid4 *
## study2) + I(covid4 * study3) + I(study1 * study2) + I(study1 *
## study3) + I(study1 * study4) + I(study2 * study3) + I(study2 *
## study4)
##
##
## Df Sum of Sq RSS AIC
## - I(covid1 * study2) 1 0.00591 2.0243 -462.84
## - I(study2 * study4) 1 0.00944 2.0279 -462.59
## - I(covid3 * study1) 1 0.01062 2.0290 -462.51
## - I(covid4 * study1) 1 0.01176 2.0302 -462.43
## - I(quiz1 * study4) 1 0.01268 2.0311 -462.36
## - I(covid3 * study4) 1 0.01309 2.0315 -462.33
## - I(quiz3 * covid1) 1 0.01447 2.0329 -462.24
## - I(covid2^2) 1 0.01776 2.0362 -462.00
## - I(study1 * study3) 1 0.01919 2.0376 -461.90
## - I(quiz3 * covid2) 1 0.02059 2.0390 -461.80
## - I(covid1 * study3) 1 0.02147 2.0399 -461.74
## - I(quiz2 * covid4) 1 0.02533 2.0437 -461.47
## <none> 2.0184 -461.26

```



```

## - I(study1 * study2) 1 0.03101 2.0494 -461.08
## - I(study2 * study3) 1 0.03530 2.0537 -460.78
## - quiz1 1 0.03923 2.0576 -460.50
## - I(quiz1^2) 1 0.04220 2.0606 -460.30
## - I(covid2 * study3) 1 0.04718 2.0656 -459.95
## - study3 1 0.04908 2.0675 -459.82
## + I(study3^2) 1 0.00690 2.0115 -459.75
## + I(quiz3 * study4) 1 0.00554 2.0129 -459.65
## - I(quiz2 * study4) 1 0.05178 2.0702 -459.63
## + I(covid4 * study4) 1 0.00528 2.0131 -459.63
## - I(study1^2) 1 0.05186 2.0703 -459.63
## + I(study3 * study4) 1 0.00518 2.0132 -459.62
## - I(covid3^2) 1 0.05214 2.0706 -459.61
## - I(quiz2 * study2) 1 0.05234 2.0708 -459.60
## - I(covid1 * covid3) 1 0.05286 2.0713 -459.56
## + I(quiz2 * covid1) 1 0.00316 2.0153 -459.48
## + I(quiz4 * covid4) 1 0.00302 2.0154 -459.47
## + I(quiz1 * study2) 1 0.00105 2.0174 -459.33
## + study2 1 0.00031 2.0181 -459.28
## + I(quiz2 * covid3) 1 0.00030 2.0181 -459.28
## + I(quiz2 * study1) 1 0.00011 2.0183 -459.26
## + I(quiz1 * study3) 1 0.00009 2.0183 -459.26
## + I(quiz4 * study4) 1 0.00003 2.0184 -459.26
## + I(covid2 * study2) 1 0.00002 2.0184 -459.26
## + I(quiz3 * study2) 1 0.00001 2.0184 -459.26
## + I(covid2 * study1) 1 0.00000 2.0184 -459.26
## - I(quiz3 * covid4) 1 0.05791 2.0763 -459.21
## - I(covid4 * study2) 1 0.05804 2.0764 -459.20
## - I(quiz4 * study2) 1 0.05893 2.0773 -459.14
## - I(covid1 * study4) 1 0.05961 2.0780 -459.09
## - I(quiz2 * study3) 1 0.05981 2.0782 -459.08
## - I(covid3 * study2) 1 0.06195 2.0804 -458.93
## - I(quiz3 * covid3) 1 0.06714 2.0856 -458.58
## - I(study2^2) 1 0.06749 2.0859 -458.55
## - I(covid2 * covid4) 1 0.06797 2.0864 -458.52
## - I(quiz3^2) 1 0.07417 2.0926 -458.10
## - I(covid4 * study3) 1 0.07839 2.0968 -457.81
## - I(covid1 * covid2) 1 0.08165 2.1001 -457.59
## - quiz2 1 0.08340 2.1018 -457.47
## - I(quiz2^2) 1 0.08384 2.1023 -457.44
## - I(covid3 * covid4) 1 0.08852 2.1069 -457.12
## - I(covid1 * study1) 1 0.09048 2.1089 -456.99
## - I(quiz3 * study1) 1 0.09826 2.1167 -456.46
## - I(quiz2 * covid2) 1 0.11152 2.1299 -455.57
## - I(study1 * study4) 1 0.11257 2.1310 -455.50
## - I(quiz4 * covid1) 1 0.11307 2.1315 -455.46
## - I(quiz1 * covid4) 1 0.12167 2.1401 -454.89
## - I(covid2 * study4) 1 0.13042 2.1488 -454.30
## - I(study4^2) 1 0.14203 2.1604 -453.53
## - study4 1 0.14651 2.1649 -453.24
## - I(covid1^2) 1 0.14729 2.1657 -453.18
## - I(covid4^2) 1 0.16369 2.1821 -452.11
## - I(quiz1 * quiz2) 1 0.19788 2.2163 -449.88
## - I(covid1 * covid4) 1 0.21804 2.2364 -448.59

```

```

## - I(covid2 * covid3) 1 0.22113 2.2395 -448.39
## - study1 1 0.22696 2.2454 -448.02
## - I(quiz1 * covid3) 1 0.23624 2.2547 -447.43
## - I(quiz1 * covid1) 1 0.25144 2.2699 -446.47
## - covid1 1 0.25692 2.2753 -446.12
## - I(quiz1 * study1) 1 0.26612 2.2845 -445.55
## - I(quiz1 * covid2) 1 0.27656 2.2950 -444.89
## - covid4 1 0.31582 2.3342 -442.47
## - covid3 1 0.31923 2.3376 -442.26
## - I(quiz2 * quiz3) 1 0.35743 2.3758 -439.94
## - quiz3 1 0.35935 2.3778 -439.83
## - I(quiz4 * covid2) 1 0.36818 2.3866 -439.30
## - covid2 1 0.37213 2.3905 -439.06
## - I(quiz4 * covid3) 1 0.39700 2.4154 -437.58
## - I(quiz3 * study3) 1 0.40186 2.4203 -437.29
## - I(quiz3 * quiz4) 1 0.41315 2.4316 -436.63
## - I(covid3 * study3) 1 0.56464 2.5831 -427.98
## - I(quiz2 * quiz4) 1 0.58746 2.6059 -426.73
## - I(quiz4 * study1) 1 0.61950 2.6379 -424.98
## - I(quiz4 * study3) 1 0.71109 2.7295 -420.10
## - I(quiz1 * quiz3) 1 1.12256 3.1410 -400.02
## - I(quiz1 * quiz4) 1 2.02598 4.0444 -363.87
##
## Step: AIC=-462.84
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
## study1 + study3 + study4 + I(quiz1^2) + I(quiz2^2) + I(quiz3^2) +
## I(covid1^2) + I(covid2^2) + I(covid3^2) + I(covid4^2) + I(study1^2) +
## I(study2^2) + I(study4^2) + I(quiz1 * quiz2) + I(quiz1 *
## quiz3) + I(quiz1 * quiz4) + I(quiz1 * covid1) + I(quiz1 *
## covid2) + I(quiz1 * covid3) + I(quiz1 * covid4) + I(quiz1 *
## study1) + I(quiz1 * study4) + I(quiz2 * quiz3) + I(quiz2 *
## quiz4) + I(quiz2 * covid2) + I(quiz2 * covid4) + I(quiz2 *
## study2) + I(quiz2 * study3) + I(quiz2 * study4) + I(quiz3 *
## quiz4) + I(quiz3 * covid1) + I(quiz3 * covid2) + I(quiz3 *
## covid3) + I(quiz3 * covid4) + I(quiz3 * study1) + I(quiz3 *
## study3) + I(quiz4 * covid1) + I(quiz4 * covid2) + I(quiz4 *
## covid3) + I(quiz4 * study1) + I(quiz4 * study2) + I(quiz4 *
## study3) + I(covid1 * covid2) + I(covid1 * covid3) + I(covid1 *
## covid4) + I(covid1 * study1) + I(covid1 * study3) + I(covid1 *
## study4) + I(covid2 * covid3) + I(covid2 * covid4) + I(covid2 *
## study3) + I(covid2 * study4) + I(covid3 * covid4) + I(covid3 *
## study1) + I(covid3 * study2) + I(covid3 * study3) + I(covid3 *
## study4) + I(covid4 * study1) + I(covid4 * study2) + I(covid4 *
## study3) + I(study1 * study2) + I(study1 * study3) + I(study1 *
## study4) + I(study2 * study3) + I(study2 * study4)
##
##
## Df Sum of Sq RSS AIC
## - I(study2 * study4) 1 0.00588 2.0302 -464.42
## - I(covid3 * study1) 1 0.01073 2.0351 -464.08
## - I(covid4 * study1) 1 0.01312 2.0374 -463.91
## - I(covid2^2) 1 0.01476 2.0391 -463.80
## - I(covid3 * study4) 1 0.01801 2.0423 -463.57
## - I(quiz1 * study4) 1 0.01807 2.0424 -463.57
## - I(quiz2 * covid4) 1 0.02104 2.0454 -463.36

```

```

## - I(study1 * study3) 1 0.02217 2.0465 -463.28
## - I(quiz3 * covid1) 1 0.02329 2.0476 -463.20
## - I(study1 * study2) 1 0.02590 2.0502 -463.02
## <none> 2.0243 -462.84
## - I(quiz3 * covid2) 1 0.02939 2.0537 -462.78
## - I(covid1 * study3) 1 0.03263 2.0570 -462.55
## - I(study2 * study3) 1 0.03879 2.0631 -462.12
## - I(covid2 * study3) 1 0.04240 2.0667 -461.87
## - I(quiz1^2) 1 0.04438 2.0687 -461.74
## - study3 1 0.04602 2.0703 -461.62
## - I(covid3^2) 1 0.04649 2.0708 -461.59
## - quiz1 1 0.04680 2.0711 -461.57
## - I(covid1 * covid3) 1 0.04869 2.0730 -461.44
## - I(quiz2 * study4) 1 0.05013 2.0745 -461.34
## + I(study3^2) 1 0.00610 2.0182 -461.27
## + I(covid1 * study2) 1 0.00591 2.0184 -461.26
## + I(covid4 * study4) 1 0.00557 2.0188 -461.23
## + I(study3 * study4) 1 0.00550 2.0188 -461.23
## + I(quiz3 * study4) 1 0.00530 2.0190 -461.21
## + I(quiz2 * covid1) 1 0.00381 2.0205 -461.11
## + I(quiz4 * covid4) 1 0.00191 2.0224 -460.97
## - I(quiz3 * covid4) 1 0.05569 2.0800 -460.96
## + I(quiz1 * study2) 1 0.00160 2.0227 -460.95
## + I(covid2 * study2) 1 0.00059 2.0237 -460.88
## - I(covid4 * study2) 1 0.05693 2.0813 -460.87
## + study2 1 0.00026 2.0241 -460.86
## + I(quiz4 * study4) 1 0.00007 2.0243 -460.84
## + I(quiz3 * study2) 1 0.00002 2.0243 -460.84
## + I(quiz2 * covid3) 1 0.00002 2.0243 -460.84
## + I(quiz1 * study3) 1 0.00001 2.0243 -460.84
## + I(covid2 * study1) 1 0.00000 2.0243 -460.84
## + I(quiz2 * study1) 1 0.00000 2.0243 -460.84
## - I(quiz2 * study2) 1 0.06037 2.0847 -460.64
## - I(covid2 * covid4) 1 0.06226 2.0866 -460.51
## - I(study2^2) 1 0.06287 2.0872 -460.46
## - I(study1^2) 1 0.06402 2.0883 -460.39
## - I(quiz2 * study3) 1 0.07104 2.0954 -459.91
## - I(covid4 * study3) 1 0.07390 2.0982 -459.71
## - I(quiz3^2) 1 0.07444 2.0988 -459.67
## - I(quiz4 * study2) 1 0.07691 2.1012 -459.51
## - I(covid3 * study2) 1 0.07728 2.1016 -459.48
## - I(quiz2^2) 1 0.07901 2.1033 -459.36
## - I(covid1 * study4) 1 0.07990 2.1042 -459.30
## - I(quiz3 * covid3) 1 0.08087 2.1052 -459.24
## - quiz2 1 0.08194 2.1063 -459.16
## - I(covid1 * study1) 1 0.08743 2.1118 -458.79
## - I(covid1 * covid2) 1 0.09431 2.1186 -458.33
## - I(quiz3 * study1) 1 0.09754 2.1219 -458.11
## - I(covid3 * covid4) 1 0.09938 2.1237 -457.98
## - I(quiz2 * covid2) 1 0.10560 2.1299 -457.57
## - I(study1 * study4) 1 0.10831 2.1326 -457.38
## - I(quiz4 * covid1) 1 0.11209 2.1364 -457.13
## - I(quiz1 * covid4) 1 0.11697 2.1413 -456.80
## - I(covid2 * study4) 1 0.12607 2.1504 -456.20

```

```

## - I(study4^2)      1  0.13861 2.1629 -455.37
## - I(covid1^2)      1  0.14869 2.1730 -454.70
## - study4           1  0.17159 2.1959 -453.20
## - I(covid4^2)      1  0.17365 2.1980 -453.07
## - I(quiz1 * quiz2) 1  0.19654 2.2209 -451.59
## - I(covid2 * covid3) 1  0.21681 2.2411 -450.29
## - study1           1  0.23041 2.2547 -449.42
## - I(quiz1 * covid3) 1  0.23445 2.2588 -449.17
## - I(covid1 * covid4) 1  0.24700 2.2713 -448.37
## - I(quiz1 * covid1) 1  0.26776 2.2921 -447.07
## - I(quiz1 * study1) 1  0.27056 2.2949 -446.90
## - I(quiz1 * covid2) 1  0.27601 2.3003 -446.56
## - covid1           1  0.27906 2.3034 -446.37
## - covid4           1  0.31104 2.3354 -444.40
## - covid3           1  0.32212 2.3464 -443.72
## - I(quiz2 * quiz3) 1  0.35169 2.3760 -441.93
## - I(quiz4 * covid2) 1  0.36231 2.3866 -441.29
## - quiz3            1  0.36679 2.3911 -441.03
## - I(quiz3 * quiz4) 1  0.41042 2.4347 -438.44
## - I(quiz4 * covid3) 1  0.41436 2.4387 -438.21
## - covid2           1  0.42232 2.4467 -437.74
## - I(quiz3 * study3) 1  0.42836 2.4527 -437.39
## - I(covid3 * study3) 1  0.58786 2.6122 -428.38
## - I(quiz2 * quiz4) 1  0.59665 2.6210 -427.90
## - I(quiz4 * study1) 1  0.61855 2.6429 -426.71
## - I(quiz4 * study3) 1  0.70572 2.7301 -422.07
## - I(quiz1 * quiz3) 1  1.11737 3.1417 -401.99
## - I(quiz1 * quiz4) 1  2.03962 4.0640 -365.18
##
## Step: AIC=-464.42
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
## study1 + study3 + study4 + I(quiz1^2) + I(quiz2^2) + I(quiz3^2) +
## I(covid1^2) + I(covid2^2) + I(covid3^2) + I(covid4^2) + I(study1^2) +
## I(study2^2) + I(study4^2) + I(quiz1 * quiz2) + I(quiz1 *
## quiz3) + I(quiz1 * quiz4) + I(quiz1 * covid1) + I(quiz1 *
## covid2) + I(quiz1 * covid3) + I(quiz1 * covid4) + I(quiz1 *
## study1) + I(quiz1 * study4) + I(quiz2 * quiz3) + I(quiz2 *
## quiz4) + I(quiz2 * covid2) + I(quiz2 * covid4) + I(quiz2 *
## study2) + I(quiz2 * study3) + I(quiz2 * study4) + I(quiz3 *
## quiz4) + I(quiz3 * covid1) + I(quiz3 * covid2) + I(quiz3 *
## covid3) + I(quiz3 * covid4) + I(quiz3 * study1) + I(quiz3 *
## study3) + I(quiz4 * covid1) + I(quiz4 * covid2) + I(quiz4 *
## covid3) + I(quiz4 * study1) + I(quiz4 * study2) + I(quiz4 *
## study3) + I(covid1 * covid2) + I(covid1 * covid3) + I(covid1 *
## covid4) + I(covid1 * study1) + I(covid1 * study3) + I(covid1 *
## study4) + I(covid2 * covid3) + I(covid2 * covid4) + I(covid2 *
## study3) + I(covid2 * study4) + I(covid3 * covid4) + I(covid3 *
## study1) + I(covid3 * study2) + I(covid3 * study3) + I(covid3 *
## study4) + I(covid4 * study1) + I(covid4 * study2) + I(covid4 *
## study3) + I(study1 * study2) + I(study1 * study3) + I(study1 *
## study4) + I(study2 * study3)
##
##
## Df Sum of Sq RSS AIC
## - I(covid2^2)      1  0.01040 2.0406 -465.69

```

```

## - I(covid3 * study1) 1 0.01227 2.0425 -465.56
## - I(covid3 * study4) 1 0.01438 2.0446 -465.41
## - I(covid4 * study1) 1 0.01519 2.0454 -465.36
## - I(quiz1 * study4) 1 0.01638 2.0466 -465.27
## - I(quiz3 * covid1) 1 0.01908 2.0493 -465.09
## - I(quiz2 * covid4) 1 0.02015 2.0504 -465.01
## - I(study1 * study2) 1 0.02649 2.0567 -464.57
## <none> 2.0302 -464.42
## - I(quiz3 * covid2) 1 0.02908 2.0593 -464.39
## - I(study1 * study3) 1 0.03351 2.0637 -464.08
## - I(covid1 * study3) 1 0.03659 2.0668 -463.87
## - I(covid2 * study3) 1 0.03843 2.0686 -463.74
## - study3 1 0.04028 2.0705 -463.61
## - I(quiz1^2) 1 0.04095 2.0712 -463.57
## - quiz1 1 0.04534 2.0755 -463.26
## + I(covid4 * study4) 1 0.00914 2.0211 -463.07
## + I(study3^2) 1 0.00705 2.0232 -462.92
## - I(quiz3 * covid4) 1 0.05097 2.0812 -462.88
## + I(study2 * study4) 1 0.00588 2.0243 -462.84
## + I(quiz2 * covid1) 1 0.00497 2.0252 -462.77
## + I(quiz3 * study4) 1 0.00292 2.0273 -462.63
## + I(quiz4 * covid4) 1 0.00280 2.0274 -462.62
## + I(covid1 * study2) 1 0.00235 2.0279 -462.59
## - I(quiz2 * study4) 1 0.05541 2.0856 -462.57
## - I(covid4 * study2) 1 0.05581 2.0860 -462.54
## + I(study3 * study4) 1 0.00121 2.0290 -462.51
## - I(covid3^2) 1 0.05645 2.0867 -462.50
## - I(quiz2 * study2) 1 0.05662 2.0868 -462.49
## + I(quiz1 * study2) 1 0.00094 2.0293 -462.49
## + I(quiz2 * covid3) 1 0.00082 2.0294 -462.48
## + I(covid2 * study2) 1 0.00049 2.0297 -462.46
## + I(quiz2 * study1) 1 0.00048 2.0297 -462.46
## + I(quiz4 * study4) 1 0.00045 2.0298 -462.45
## + study2 1 0.00044 2.0298 -462.45
## + I(quiz1 * study3) 1 0.00026 2.0299 -462.44
## + I(quiz3 * study2) 1 0.00000 2.0302 -462.42
## + I(covid2 * study1) 1 0.00000 2.0302 -462.42
## - I(study2^2) 1 0.06154 2.0917 -462.15
## - I(study1^2) 1 0.06233 2.0925 -462.10
## - I(covid1 * covid3) 1 0.06289 2.0931 -462.06
## - I(quiz2 * study3) 1 0.06709 2.0973 -461.77
## - I(covid2 * covid4) 1 0.06776 2.0980 -461.73
## - I(covid4 * study3) 1 0.06813 2.0983 -461.70
## - I(quiz3^2) 1 0.07077 2.1010 -461.52
## - I(quiz4 * study2) 1 0.07265 2.1029 -461.40
## - I(covid3 * study2) 1 0.07340 2.1036 -461.34
## - I(quiz2^2) 1 0.07884 2.1091 -460.97
## - I(covid1 * study1) 1 0.08168 2.1119 -460.78
## - I(quiz3 * covid3) 1 0.08285 2.1131 -460.70
## - quiz2 1 0.08538 2.1156 -460.53
## - I(covid1 * covid2) 1 0.08859 2.1188 -460.32
## - I(quiz3 * study1) 1 0.09332 2.1235 -460.00
## - I(covid3 * covid4) 1 0.09952 2.1297 -459.58
## - I(covid1 * study4) 1 0.09959 2.1298 -459.58

```

```

## - I(study2 * study3) 1 0.10095 2.1312 -459.48
## - I(quiz4 * covid1) 1 0.10815 2.1384 -459.00
## - I(quiz2 * covid2) 1 0.11010 2.1403 -458.87
## - I(covid2 * study4) 1 0.12057 2.1508 -458.17
## - I(study1 * study4) 1 0.12209 2.1523 -458.07
## - I(quiz1 * covid4) 1 0.12245 2.1527 -458.05
## - I(covid1^2) 1 0.14882 2.1790 -456.31
## - study4 1 0.18604 2.2162 -453.89
## - I(covid4^2) 1 0.18606 2.2163 -453.88
## - I(study4^2) 1 0.19689 2.2271 -453.19
## - I(quiz1 * quiz2) 1 0.19709 2.2273 -453.17
## - study1 1 0.23045 2.2607 -451.05
## - I(covid1 * covid4) 1 0.24160 2.2718 -450.34
## - I(quiz1 * covid3) 1 0.25501 2.2852 -449.50
## - I(covid2 * covid3) 1 0.26294 2.2931 -449.01
## - I(quiz1 * covid1) 1 0.26309 2.2933 -449.00
## - I(quiz1 * study1) 1 0.26758 2.2978 -448.72
## - covid1 1 0.28944 2.3196 -447.36
## - I(quiz1 * covid2) 1 0.29643 2.3266 -446.93
## - covid4 1 0.30552 2.3357 -446.38
## - covid3 1 0.33193 2.3621 -444.77
## - I(quiz4 * covid2) 1 0.35889 2.3891 -443.15
## - I(quiz2 * quiz3) 1 0.38350 2.4137 -441.68
## - I(quiz3 * quiz4) 1 0.40494 2.4351 -440.42
## - I(quiz4 * covid3) 1 0.41526 2.4455 -439.81
## - quiz3 1 0.43040 2.4606 -438.93
## - I(quiz3 * study3) 1 0.44122 2.4714 -438.30
## - covid2 1 0.46361 2.4938 -437.01
## - I(covid3 * study3) 1 0.58207 2.6123 -430.37
## - I(quiz2 * quiz4) 1 0.60564 2.6358 -429.09
## - I(quiz4 * study1) 1 0.61293 2.6431 -428.70
## - I(quiz4 * study3) 1 0.70341 2.7336 -423.88
## - I(quiz1 * quiz3) 1 1.11150 3.1417 -403.99
## - I(quiz1 * quiz4) 1 2.13063 4.1608 -363.81
##
## Step: AIC=-465.69
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
## study1 + study3 + study4 + I(quiz1^2) + I(quiz2^2) + I(quiz3^2) +
## I(covid1^2) + I(covid3^2) + I(covid4^2) + I(study1^2) + I(study2^2) +
## I(study4^2) + I(quiz1 * quiz2) + I(quiz1 * quiz3) + I(quiz1 *
## quiz4) + I(quiz1 * covid1) + I(quiz1 * covid2) + I(quiz1 *
## covid3) + I(quiz1 * covid4) + I(quiz1 * study1) + I(quiz1 *
## study4) + I(quiz2 * quiz3) + I(quiz2 * quiz4) + I(quiz2 *
## covid2) + I(quiz2 * covid4) + I(quiz2 * study2) + I(quiz2 *
## study3) + I(quiz2 * study4) + I(quiz3 * quiz4) + I(quiz3 *
## covid1) + I(quiz3 * covid2) + I(quiz3 * covid3) + I(quiz3 *
## covid4) + I(quiz3 * study1) + I(quiz3 * study3) + I(quiz4 *
## covid1) + I(quiz4 * covid2) + I(quiz4 * covid3) + I(quiz4 *
## study1) + I(quiz4 * study2) + I(quiz4 * study3) + I(covid1 *
## covid2) + I(covid1 * covid3) + I(covid1 * covid4) + I(covid1 *
## study1) + I(covid1 * study3) + I(covid1 * study4) + I(covid2 *
## covid3) + I(covid2 * covid4) + I(covid2 * study3) + I(covid2 *
## study4) + I(covid3 * covid4) + I(covid3 * study1) + I(covid3 *
## study2) + I(covid3 * study3) + I(covid3 * study4) + I(covid4 *

```

```

##      study1) + I(covid4 * study2) + I(covid4 * study3) + I(study1 *
##      study2) + I(study1 * study3) + I(study1 * study4) + I(study2 *
##      study3)
##
##
##      Df Sum of Sq    RSS    AIC
## - I(covid3 * study4)  1    0.00718 2.0478 -467.19
## - I(covid3 * study1)  1    0.01098 2.0516 -466.92
## - I(covid4 * study1)  1    0.01233 2.0529 -466.83
## - I(quiz3 * covid1)   1    0.01600 2.0566 -466.58
## - I(quiz2 * covid4)   1    0.01713 2.0577 -466.50
## - I(quiz1 * study4)   1    0.01949 2.0601 -466.33
## - I(study1 * study2)   1    0.02508 2.0657 -465.95
## - I(quiz3 * covid2)   1    0.02626 2.0669 -465.86
## <none>                2.0406 -465.69
## - I(study1 * study3)   1    0.03389 2.0745 -465.34
## - I(covid2 * study3)   1    0.04183 2.0824 -464.79
## - I(quiz1^2)           1    0.04440 2.0850 -464.61
## - I(covid1 * study3)   1    0.04477 2.0854 -464.59
## + I(covid4 * study4)   1    0.01063 2.0300 -464.44
## + I(covid2^2)          1    0.01040 2.0302 -464.42
## - quiz1                1    0.04770 2.0883 -464.39
## + I(quiz2 * covid1)    1    0.00959 2.0310 -464.37
## - study3               1    0.04806 2.0887 -464.36
## - I(quiz2 * study4)    1    0.05127 2.0919 -464.14
## + I(study3^2)          1    0.00618 2.0344 -464.13
## + I(quiz3 * study4)    1    0.00598 2.0346 -464.11
## + I(covid2 * study2)    1    0.00426 2.0363 -463.99
## - I(covid4 * study2)    1    0.05360 2.0942 -463.98
## - I(quiz3 * covid4)    1    0.05394 2.0946 -463.96
## + I(quiz2 * covid3)    1    0.00286 2.0378 -463.89
## + I(quiz1 * study2)    1    0.00244 2.0382 -463.86
## + I(study3 * study4)    1    0.00211 2.0385 -463.84
## + I(covid1 * study2)    1    0.00169 2.0389 -463.81
## + I(study2 * study4)    1    0.00152 2.0391 -463.80
## + I(quiz4 * covid4)    1    0.00094 2.0397 -463.76
## + I(quiz3 * study2)    1    0.00055 2.0401 -463.73
## + study2               1    0.00054 2.0401 -463.73
## + I(quiz2 * study1)    1    0.00019 2.0404 -463.71
## + I(quiz1 * study3)    1    0.00015 2.0405 -463.70
## + I(covid2 * study1)    1    0.00009 2.0405 -463.70
## + I(quiz4 * study4)    1    0.00007 2.0405 -463.70
## - I(covid2 * covid4)    1    0.05822 2.0988 -463.67
## - I(study1^2)          1    0.05822 2.0988 -463.67
## - I(quiz2 * study2)    1    0.05852 2.0991 -463.65
## - I(quiz2 * study3)    1    0.06021 2.1008 -463.53
## - I(study2^2)          1    0.06181 2.1024 -463.43
## - I(quiz4 * study2)    1    0.06673 2.1073 -463.09
## - I(quiz3^2)           1    0.07221 2.1128 -462.72
## - I(quiz2^2)           1    0.07277 2.1134 -462.68
## - I(covid1 * covid3)    1    0.07694 2.1175 -462.40
## - I(covid1 * covid2)    1    0.07924 2.1199 -462.24
## - I(covid1 * study1)    1    0.07971 2.1203 -462.21
## - I(covid3 * study2)    1    0.08364 2.1242 -461.95
## - I(covid4 * study3)    1    0.08638 2.1270 -461.76

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## - I(covid3^2)      1    0.08754 2.1281 -461.69
## - quiz2            1    0.08876 2.1294 -461.60
## - I(quiz3 * study1) 1    0.09018 2.1308 -461.51
## - I(study2 * study3) 1    0.09539 2.1360 -461.16
## - I(quiz3 * covid3) 1    0.09677 2.1374 -461.07
## - I(covid1 * study4) 1    0.09717 2.1378 -461.04
## - I(quiz2 * covid2) 1    0.09978 2.1404 -460.87
## - I(quiz4 * covid1) 1    0.10029 2.1409 -460.83
## - I(study1 * study4) 1    0.11370 2.1543 -459.94
## - I(quiz1 * covid4) 1    0.12229 2.1629 -459.37
## - I(covid1^2)      1    0.13907 2.1797 -458.26
## - I(covid2 * study4) 1    0.16546 2.2061 -456.54
## - study4           1    0.17613 2.2167 -455.85
## - I(covid3 * covid4) 1    0.17677 2.2174 -455.81
## - I(study4^2)      1    0.18926 2.2299 -455.01
## - study1           1    0.22207 2.2627 -452.92
## - I(quiz1 * quiz2) 1    0.22914 2.2697 -452.47
## - I(covid1 * covid4) 1    0.24199 2.2826 -451.67
## - I(quiz1 * covid1) 1    0.25639 2.2970 -450.77
## - I(quiz1 * study1) 1    0.25755 2.2982 -450.70
## - I(quiz1 * covid3) 1    0.26186 2.3025 -450.43
## - I(covid4^2)      1    0.26500 2.3056 -450.23
## - covid1           1    0.29107 2.3317 -448.62
## - covid4           1    0.30451 2.3451 -447.80
## - I(quiz1 * covid2) 1    0.31861 2.3592 -446.95
## - I(quiz4 * covid2) 1    0.36940 2.4100 -443.90
## - I(quiz2 * quiz3) 1    0.37983 2.4204 -443.28
## - I(quiz3 * quiz4) 1    0.39458 2.4352 -442.41
## - I(quiz3 * study3) 1    0.43085 2.4715 -440.30
## - quiz3            1    0.43352 2.4741 -440.14
## - covid3           1    0.44493 2.4855 -439.49
## - I(quiz4 * covid3) 1    0.53666 2.5773 -434.30
## - covid2           1    0.54030 2.5809 -434.10
## - I(covid2 * covid3) 1    0.58402 2.6246 -431.70
## - I(quiz4 * study1) 1    0.60457 2.6452 -430.59
## - I(quiz2 * quiz4) 1    0.62340 2.6640 -429.57
## - I(covid3 * study3) 1    0.66211 2.7027 -427.51
## - I(quiz4 * study3) 1    0.71412 2.7547 -424.78
## - I(quiz1 * quiz3) 1    1.11905 3.1597 -405.17
## - I(quiz1 * quiz4) 1    2.18988 4.2305 -363.44
##
## Step:  AIC=-467.19
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
## study1 + study3 + study4 + I(quiz1^2) + I(quiz2^2) + I(quiz3^2) +
## I(covid1^2) + I(covid3^2) + I(covid4^2) + I(study1^2) + I(study2^2) +
## I(study4^2) + I(quiz1 * quiz2) + I(quiz1 * quiz3) + I(quiz1 *
## quiz4) + I(quiz1 * covid1) + I(quiz1 * covid2) + I(quiz1 *
## covid3) + I(quiz1 * covid4) + I(quiz1 * study1) + I(quiz1 *
## study4) + I(quiz2 * quiz3) + I(quiz2 * quiz4) + I(quiz2 *
## covid2) + I(quiz2 * covid4) + I(quiz2 * study2) + I(quiz2 *
## study3) + I(quiz2 * study4) + I(quiz3 * quiz4) + I(quiz3 *
## covid1) + I(quiz3 * covid2) + I(quiz3 * covid3) + I(quiz3 *
## covid4) + I(quiz3 * study1) + I(quiz3 * study3) + I(quiz4 *
## covid1) + I(quiz4 * covid2) + I(quiz4 * covid3) + I(quiz4 *

```



```

##      study1) + I(quiz4 * study2) + I(quiz4 * study3) + I(covid1 *
##      covid2) + I(covid1 * covid3) + I(covid1 * covid4) + I(covid1 *
##      study1) + I(covid1 * study3) + I(covid1 * study4) + I(covid2 *
##      covid3) + I(covid2 * covid4) + I(covid2 * study3) + I(covid2 *
##      study4) + I(covid3 * covid4) + I(covid3 * study1) + I(covid3 *
##      study2) + I(covid3 * study3) + I(covid4 * study1) + I(covid4 *
##      study2) + I(covid4 * study3) + I(study1 * study2) + I(study1 *
##      study3) + I(study1 * study4) + I(study2 * study3)
##
##              Df Sum of Sq    RSS    AIC
## - I(covid3 * study1)  1   0.00586 2.0537 -468.78
## - I(covid4 * study1)  1   0.00931 2.0571 -468.54
## - I(quiz2 * covid4)   1   0.01359 2.0614 -468.24
## - I(quiz3 * covid1)   1   0.01885 2.0666 -467.88
## - I(quiz3 * covid2)   1   0.02352 2.0713 -467.56
## - I(study1 * study2)  1   0.02359 2.0714 -467.55
## <none>                                2.0478 -467.19
## - I(study1 * study3)  1   0.03201 2.0798 -466.97
## - I(quiz1 * study4)   1   0.03559 2.0834 -466.73
## + I(covid4 * study4)  1   0.01588 2.0319 -466.30
## + I(quiz2 * covid1)   1   0.01287 2.0349 -466.09
## - study3              1   0.04514 2.0929 -466.07
## - I(covid4 * study2)  1   0.04687 2.0947 -465.95
## - I(quiz2 * study4)   1   0.04753 2.0953 -465.91
## - I(covid1 * study3)  1   0.04914 2.0969 -465.80
## - I(quiz1^2)          1   0.05006 2.0978 -465.74
## + I(covid3 * study4)  1   0.00718 2.0406 -465.69
## + I(study3^2)         1   0.00578 2.0420 -465.59
## - I(covid2 * covid4)  1   0.05223 2.1000 -465.59
## + I(covid2 * study2)  1   0.00469 2.0431 -465.52
## + I(quiz3 * study4)   1   0.00452 2.0433 -465.51
## + I(covid1 * study2)  1   0.00447 2.0433 -465.50
## - I(quiz2 * study2)   1   0.05413 2.1019 -465.46
## - I(quiz2 * study3)   1   0.05443 2.1022 -465.44
## + I(covid2^2)         1   0.00321 2.0446 -465.41
## - quiz1              1   0.05510 2.1029 -465.39
## + I(study3 * study4)  1   0.00273 2.0451 -465.38
## + I(quiz1 * study2)   1   0.00265 2.0451 -465.37
## + I(quiz4 * covid4)   1   0.00160 2.0462 -465.30
## - I(quiz3 * covid4)   1   0.05669 2.1045 -465.28
## - I(study1^2)         1   0.05691 2.1047 -465.27
## - I(study2^2)         1   0.05706 2.1049 -465.26
## + study2              1   0.00098 2.0468 -465.26
## + I(study2 * study4)  1   0.00098 2.0468 -465.26
## + I(quiz1 * study3)   1   0.00067 2.0471 -465.24
## + I(covid2 * study1)  1   0.00059 2.0472 -465.23
## - I(covid2 * study3)  1   0.05774 2.1055 -465.21
## + I(quiz3 * study2)   1   0.00020 2.0476 -465.20
## + I(quiz2 * covid3)   1   0.00005 2.0477 -465.19
## + I(quiz2 * study1)   1   0.00002 2.0478 -465.19
## + I(quiz4 * study4)   1   0.00000 2.0478 -465.19
## - I(quiz4 * study2)   1   0.06292 2.1107 -464.86
## - I(quiz3^2)          1   0.06774 2.1155 -464.54
## - I(quiz2^2)          1   0.06869 2.1165 -464.47

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## - I(covid1 * covid3) 1 0.07179 2.1196 -464.26
## - I(covid3 * study2) 1 0.07705 2.1248 -463.91
## - I(covid1 * covid2) 1 0.07966 2.1275 -463.73
## - I(covid4 * study3) 1 0.08096 2.1288 -463.65
## - I(quiz3 * study1) 1 0.08657 2.1344 -463.27
## - I(covid3^2) 1 0.09005 2.1378 -463.04
## - I(study2 * study3) 1 0.09135 2.1391 -462.95
## - I(quiz3 * covid3) 1 0.09175 2.1395 -462.92
## - I(covid1 * study4) 1 0.09281 2.1406 -462.85
## - I(quiz2 * covid2) 1 0.09355 2.1413 -462.80
## - I(quiz4 * covid1) 1 0.10756 2.1554 -461.87
## - I(covid1 * study1) 1 0.11246 2.1603 -461.54
## - quiz2 1 0.11587 2.1637 -461.32
## - I(study1 * study4) 1 0.12611 2.1739 -460.64
## - I(quiz1 * covid4) 1 0.12661 2.1744 -460.61
## - I(covid1^2) 1 0.13221 2.1800 -460.24
## - I(covid3 * covid4) 1 0.17208 2.2199 -457.65
## - I(study4^2) 1 0.18678 2.2346 -456.71
## - study4 1 0.20168 2.2495 -455.76
## - I(covid2 * study4) 1 0.20883 2.2566 -455.30
## - study1 1 0.21513 2.2629 -454.90
## - I(quiz1 * covid1) 1 0.24932 2.2971 -452.76
## - I(quiz1 * study1) 1 0.25596 2.3037 -452.35
## - I(covid4^2) 1 0.25782 2.3056 -452.23
## - I(covid1 * covid4) 1 0.26362 2.3114 -451.87
## - I(quiz1 * quiz2) 1 0.27504 2.3228 -451.17
## - covid1 1 0.28408 2.3319 -450.61
## - I(quiz1 * covid3) 1 0.29066 2.3385 -450.21
## - covid4 1 0.31165 2.3594 -448.93
## - I(quiz1 * covid2) 1 0.34314 2.3909 -447.04
## - I(quiz4 * covid2) 1 0.36579 2.4136 -445.69
## - I(quiz2 * quiz3) 1 0.37404 2.4218 -445.20
## - I(quiz3 * quiz4) 1 0.41872 2.4665 -442.59
## - I(quiz3 * study3) 1 0.42586 2.4737 -442.17
## - quiz3 1 0.43187 2.4797 -441.83
## - covid3 1 0.48268 2.5305 -438.92
## - I(quiz4 * covid3) 1 0.52967 2.5775 -436.29
## - covid2 1 0.56207 2.6099 -434.51
## - I(covid2 * covid3) 1 0.59292 2.6407 -432.83
## - I(quiz4 * study1) 1 0.60248 2.6503 -432.31
## - I(quiz2 * quiz4) 1 0.62151 2.6693 -431.29
## - I(quiz4 * study3) 1 0.70730 2.7551 -426.76
## - I(covid3 * study3) 1 0.77411 2.8219 -423.34
## - I(quiz1 * quiz3) 1 1.12521 3.1730 -406.57
## - I(quiz1 * quiz4) 1 2.24511 4.2929 -363.34
##
## Step: AIC=-468.78
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
## study1 + study3 + study4 + I(quiz1^2) + I(quiz2^2) + I(quiz3^2) +
## I(covid1^2) + I(covid3^2) + I(covid4^2) + I(study1^2) + I(study2^2) +
## I(study4^2) + I(quiz1 * quiz2) + I(quiz1 * quiz3) + I(quiz1 *
## quiz4) + I(quiz1 * covid1) + I(quiz1 * covid2) + I(quiz1 *
## covid3) + I(quiz1 * covid4) + I(quiz1 * study1) + I(quiz1 *
## study4) + I(quiz2 * quiz3) + I(quiz2 * quiz4) + I(quiz2 *

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## covid2) + I(quiz2 * covid4) + I(quiz2 * study2) + I(quiz2 *
## study3) + I(quiz2 * study4) + I(quiz3 * quiz4) + I(quiz3 *
## covid1) + I(quiz3 * covid2) + I(quiz3 * covid3) + I(quiz3 *
## covid4) + I(quiz3 * study1) + I(quiz3 * study3) + I(quiz4 *
## covid1) + I(quiz4 * covid2) + I(quiz4 * covid3) + I(quiz4 *
## study1) + I(quiz4 * study2) + I(quiz4 * study3) + I(covid1 *
## covid2) + I(covid1 * covid3) + I(covid1 * covid4) + I(covid1 *
## study1) + I(covid1 * study3) + I(covid1 * study4) + I(covid2 *
## covid3) + I(covid2 * covid4) + I(covid2 * study3) + I(covid2 *
## study4) + I(covid3 * covid4) + I(covid3 * study2) + I(covid3 *
## study3) + I(covid4 * study1) + I(covid4 * study2) + I(covid4 *
## study3) + I(study1 * study2) + I(study1 * study3) + I(study1 *
## study4) + I(study2 * study3)
##
##
## Df Sum of Sq RSS AIC
## - I(covid4 * study1) 1 0.00361 2.0573 -470.53
## - I(quiz2 * covid4) 1 0.01549 2.0691 -469.71
## - I(quiz3 * covid1) 1 0.01555 2.0692 -469.70
## - I(study1 * study2) 1 0.01900 2.0727 -469.46
## - I(quiz3 * covid2) 1 0.02093 2.0746 -469.33
## <none> 2.0537 -468.78
## - I(study1 * study3) 1 0.03141 2.0851 -468.61
## - study3 1 0.03976 2.0934 -468.04
## - I(covid4 * study2) 1 0.04313 2.0968 -467.81
## - I(quiz1^2) 1 0.04589 2.0995 -467.62
## + I(covid4 * study4) 1 0.01144 2.0422 -467.58
## - I(quiz1 * study4) 1 0.04854 2.1022 -467.44
## - I(quiz2 * study3) 1 0.04858 2.1022 -467.44
## + I(study3^2) 1 0.00867 2.0450 -467.39
## - quiz1 1 0.04950 2.1032 -467.38
## + I(quiz2 * covid1) 1 0.00740 2.0463 -467.30
## - I(quiz2 * study2) 1 0.05089 2.1045 -467.28
## + I(quiz3 * study4) 1 0.00602 2.0476 -467.20
## + I(covid3 * study1) 1 0.00586 2.0478 -467.19
## - I(quiz2 * study4) 1 0.05265 2.1063 -467.16
## - I(covid2 * study3) 1 0.05290 2.1066 -467.14
## - I(study2^2) 1 0.05340 2.1071 -467.11
## + I(covid2^2) 1 0.00438 2.0493 -467.09
## - I(study1^2) 1 0.05378 2.1074 -467.08
## - I(covid2 * covid4) 1 0.05411 2.1078 -467.06
## + I(covid2 * study2) 1 0.00372 2.0499 -467.04
## - I(quiz3 * covid4) 1 0.05484 2.1085 -467.01
## + I(study3 * study4) 1 0.00326 2.0504 -467.01
## + I(covid1 * study2) 1 0.00283 2.0508 -466.98
## + I(quiz1 * study3) 1 0.00234 2.0513 -466.94
## + I(covid3 * study4) 1 0.00206 2.0516 -466.92
## + I(study2 * study4) 1 0.00181 2.0518 -466.91
## + I(quiz4 * covid4) 1 0.00076 2.0529 -466.83
## + I(quiz1 * study2) 1 0.00036 2.0533 -466.81
## + I(quiz3 * study2) 1 0.00016 2.0535 -466.79
## + I(quiz2 * study1) 1 0.00010 2.0536 -466.79
## + study2 1 0.00006 2.0536 -466.78
## + I(quiz2 * covid3) 1 0.00002 2.0536 -466.78
## + I(quiz4 * study4) 1 0.00001 2.0536 -466.78

```

```

## + I(covid2 * study1) 1 0.00000 2.0537 -466.78
## - I(covid1 * study3) 1 0.06033 2.1140 -466.64
## - I(quiz4 * study2) 1 0.06485 2.1185 -466.34
## - I(quiz3^2) 1 0.06886 2.1225 -466.06
## - I(quiz2^2) 1 0.07426 2.1279 -465.70
## - I(covid1 * covid3) 1 0.07535 2.1290 -465.63
## - I(covid4 * study3) 1 0.07979 2.1334 -465.33
## - I(covid1 * covid2) 1 0.08056 2.1342 -465.28
## - I(covid3 * study2) 1 0.08132 2.1350 -465.23
## - I(quiz3 * covid3) 1 0.08675 2.1404 -464.86
## - I(covid1 * study4) 1 0.08702 2.1407 -464.85
## - I(quiz2 * covid2) 1 0.09470 2.1484 -464.33
## - I(quiz3 * study1) 1 0.09858 2.1522 -464.08
## - I(covid3^2) 1 0.10070 2.1544 -463.94
## - I(study2 * study3) 1 0.10091 2.1546 -463.92
## - I(quiz4 * covid1) 1 0.10372 2.1574 -463.74
## - quiz2 1 0.12520 2.1789 -462.32
## - I(study1 * study4) 1 0.12634 2.1800 -462.24
## - I(quiz1 * covid4) 1 0.12658 2.1802 -462.23
## - I(covid1^2) 1 0.13778 2.1914 -461.50
## - I(covid1 * study1) 1 0.15247 2.2061 -460.54
## - I(covid3 * covid4) 1 0.17001 2.2237 -459.41
## - I(study4^2) 1 0.18798 2.2416 -458.26
## - I(covid2 * study4) 1 0.21628 2.2699 -456.46
## - study1 1 0.23006 2.2837 -455.60
## - study4 1 0.23772 2.2914 -455.12
## - I(covid4^2) 1 0.26127 2.3149 -453.66
## - I(quiz1 * covid1) 1 0.26318 2.3168 -453.54
## - I(quiz1 * study1) 1 0.26357 2.3172 -453.51
## - I(covid1 * covid4) 1 0.27045 2.3241 -453.09
## - I(quiz1 * quiz2) 1 0.27879 2.3324 -452.58
## - covid4 1 0.30651 2.3602 -450.89
## - I(quiz1 * covid3) 1 0.32414 2.3778 -449.82
## - I(quiz1 * covid2) 1 0.33772 2.3914 -449.01
## - covid1 1 0.35702 2.4107 -447.86
## - I(quiz4 * covid2) 1 0.36671 2.4204 -447.29
## - I(quiz2 * quiz3) 1 0.36875 2.4224 -447.17
## - I(quiz3 * quiz4) 1 0.42215 2.4758 -444.05
## - quiz3 1 0.42779 2.4814 -443.72
## - I(quiz3 * study3) 1 0.44712 2.5008 -442.61
## - covid3 1 0.48078 2.5344 -440.70
## - I(quiz4 * covid3) 1 0.52923 2.5829 -437.99
## - covid2 1 0.55646 2.6101 -436.49
## - I(covid2 * covid3) 1 0.59732 2.6510 -434.27
## - I(quiz4 * study1) 1 0.60745 2.6611 -433.73
## - I(quiz2 * quiz4) 1 0.61588 2.6695 -433.27
## - I(quiz4 * study3) 1 0.70619 2.7598 -428.52
## - I(covid3 * study3) 1 0.78979 2.8434 -424.25
## - I(quiz1 * quiz3) 1 1.20941 3.2631 -404.57
## - I(quiz1 * quiz4) 1 2.24005 4.2937 -365.31
##
## Step: AIC=-470.53
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
## study1 + study3 + study4 + I(quiz1^2) + I(quiz2^2) + I(quiz3^2) +

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##      I(covid1^2) + I(covid3^2) + I(covid4^2) + I(study1^2) + I(study2^2) +
##      I(study4^2) + I(quiz1 * quiz2) + I(quiz1 * quiz3) + I(quiz1 *
##      quiz4) + I(quiz1 * covid1) + I(quiz1 * covid2) + I(quiz1 *
##      covid3) + I(quiz1 * covid4) + I(quiz1 * study1) + I(quiz1 *
##      study4) + I(quiz2 * quiz3) + I(quiz2 * quiz4) + I(quiz2 *
##      covid2) + I(quiz2 * covid4) + I(quiz2 * study2) + I(quiz2 *
##      study3) + I(quiz2 * study4) + I(quiz3 * quiz4) + I(quiz3 *
##      covid1) + I(quiz3 * covid2) + I(quiz3 * covid3) + I(quiz3 *
##      covid4) + I(quiz3 * study1) + I(quiz3 * study3) + I(quiz4 *
##      covid1) + I(quiz4 * covid2) + I(quiz4 * covid3) + I(quiz4 *
##      study1) + I(quiz4 * study2) + I(quiz4 * study3) + I(covid1 *
##      covid2) + I(covid1 * covid3) + I(covid1 * covid4) + I(covid1 *
##      study1) + I(covid1 * study3) + I(covid1 * study4) + I(covid2 *
##      covid3) + I(covid2 * covid4) + I(covid2 * study3) + I(covid2 *
##      study4) + I(covid3 * covid4) + I(covid3 * study2) + I(covid3 *
##      study3) + I(covid4 * study2) + I(covid4 * study3) + I(study1 *
##      study2) + I(study1 * study3) + I(study1 * study4) + I(study2 *
##      study3)
##
##
##      Df Sum of Sq    RSS    AIC
## - I(quiz2 * covid4)      1    0.01941 2.0767 -471.19
## - I(quiz3 * covid1)      1    0.02081 2.0781 -471.09
## - I(study1 * study2)      1    0.02187 2.0791 -471.02
## - I(quiz3 * covid2)      1    0.02270 2.0800 -470.96
## - I(study1 * study3)      1    0.02781 2.0851 -470.61
## <none>                                2.0573 -470.53
## - study3                        1    0.03615 2.0934 -470.04
## - I(quiz2 * study3)          1    0.04499 2.1023 -469.44
## + I(covid4 * study4)          1    0.01276 2.0445 -469.42
## - I(quiz1^2)                  1    0.04640 2.1037 -469.34
## - quiz1                        1    0.04646 2.1037 -469.34
## - I(covid4 * study2)          1    0.04740 2.1047 -469.27
## - I(quiz2 * study2)          1    0.04742 2.1047 -469.27
## - I(quiz1 * study4)          1    0.04912 2.1064 -469.16
## + I(quiz2 * covid1)          1    0.00880 2.0485 -469.14
## - I(covid2 * study3)          1    0.04983 2.1071 -469.11
## - I(study1^2)                  1    0.05055 2.1078 -469.06
## - I(covid2 * covid4)          1    0.05145 2.1087 -469.00
## + I(study3^2)                  1    0.00538 2.0519 -468.90
## + I(quiz3 * study4)          1    0.00508 2.0522 -468.88
## + I(covid2 * study2)          1    0.00376 2.0535 -468.79
## + I(covid1 * study2)          1    0.00371 2.0536 -468.79
## + I(covid4 * study1)          1    0.00361 2.0537 -468.78
## - I(quiz2 * study4)          1    0.05482 2.1121 -468.77
## - I(study2^2)                  1    0.05498 2.1122 -468.76
## + I(covid2^2)                  1    0.00297 2.0543 -468.74
## + I(quiz4 * covid4)          1    0.00296 2.0543 -468.74
## + I(covid3 * study4)          1    0.00294 2.0543 -468.73
## + I(study3 * study4)          1    0.00273 2.0545 -468.72
## + I(quiz1 * study3)          1    0.00241 2.0549 -468.70
## + I(study2 * study4)          1    0.00220 2.0551 -468.68
## + I(covid2 * study1)          1    0.00087 2.0564 -468.59
## + I(quiz2 * study1)          1    0.00027 2.0570 -468.55
## + I(quiz1 * study2)          1    0.00023 2.0570 -468.55

```

```

## + I(quiz2 * covid3) 1 0.00021 2.0571 -468.54
## + I(quiz3 * study2) 1 0.00019 2.0571 -468.54
## + I(quiz4 * study4) 1 0.00015 2.0571 -468.54
## + I(covid3 * study1) 1 0.00015 2.0571 -468.54
## + study2 1 0.00001 2.0572 -468.53
## - I(quiz3 * covid4) 1 0.05903 2.1163 -468.48
## - I(quiz4 * study2) 1 0.06166 2.1189 -468.31
## - I(covid1 * covid3) 1 0.07666 2.1339 -467.30
## - I(covid1 * study3) 1 0.07809 2.1353 -467.20
## - I(covid4 * study3) 1 0.07960 2.1369 -467.10
## - I(quiz2^2) 1 0.08091 2.1382 -467.01
## - I(covid1 * study4) 1 0.08515 2.1424 -466.73
## - I(covid1 * covid2) 1 0.08817 2.1454 -466.53
## - I(quiz3^2) 1 0.08938 2.1466 -466.45
## - I(quiz3 * covid3) 1 0.08966 2.1469 -466.43
## - I(quiz3 * study1) 1 0.09664 2.1539 -465.97
## - I(covid3^2) 1 0.09730 2.1546 -465.92
## - I(study2 * study3) 1 0.09735 2.1546 -465.92
## - I(covid3 * study2) 1 0.09813 2.1554 -465.87
## - I(quiz4 * covid1) 1 0.10201 2.1593 -465.61
## - I(quiz2 * covid2) 1 0.10706 2.1643 -465.28
## - quiz2 1 0.12707 2.1843 -463.96
## - I(quiz1 * covid4) 1 0.12910 2.1864 -463.83
## - I(covid1^2) 1 0.16695 2.2242 -461.37
## - I(study4^2) 1 0.18650 2.2438 -460.12
## - I(covid3 * covid4) 1 0.18994 2.2472 -459.90
## - I(study1 * study4) 1 0.19540 2.2527 -459.55
## - I(covid2 * study4) 1 0.22535 2.2826 -457.67
## - study1 1 0.22651 2.2838 -457.59
## - I(quiz1 * covid1) 1 0.26014 2.3174 -455.50
## - I(covid4^2) 1 0.26238 2.3196 -455.36
## - I(quiz1 * study1) 1 0.26284 2.3201 -455.34
## - I(covid1 * study1) 1 0.27278 2.3300 -454.73
## - I(covid1 * covid4) 1 0.27447 2.3317 -454.62
## - study4 1 0.28007 2.3373 -454.28
## - I(quiz1 * quiz2) 1 0.28670 2.3440 -453.87
## - I(quiz1 * covid3) 1 0.32193 2.3792 -451.74
## - covid4 1 0.32827 2.3855 -451.36
## - I(quiz1 * covid2) 1 0.33420 2.3915 -451.00
## - I(quiz2 * quiz3) 1 0.36539 2.4227 -449.15
## - I(quiz4 * covid2) 1 0.36559 2.4228 -449.14
## - covid1 1 0.37867 2.4359 -448.37
## - I(quiz3 * quiz4) 1 0.41948 2.4767 -445.99
## - quiz3 1 0.42718 2.4844 -445.55
## - I(quiz3 * study3) 1 0.44679 2.5041 -444.43
## - covid3 1 0.53854 2.5958 -439.28
## - covid2 1 0.55821 2.6155 -438.20
## - I(quiz4 * covid3) 1 0.57210 2.6294 -437.44
## - I(covid2 * covid3) 1 0.61817 2.6754 -434.96
## - I(quiz4 * study1) 1 0.62311 2.6804 -434.70
## - I(quiz2 * quiz4) 1 0.62508 2.6823 -434.59
## - I(quiz4 * study3) 1 0.71911 2.7764 -429.66
## - I(covid3 * study3) 1 0.81650 2.8738 -424.73
## - I(quiz1 * quiz3) 1 1.31097 3.3682 -402.03

```

```

## - I(quiz1 * quiz4)      1    2.24196 4.2992 -367.13
##
## Step:  AIC=-471.19
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
##      study1 + study3 + study4 + I(quiz1^2) + I(quiz2^2) + I(quiz3^2) +
##      I(covid1^2) + I(covid3^2) + I(covid4^2) + I(study1^2) + I(study2^2) +
##      I(study4^2) + I(quiz1 * quiz2) + I(quiz1 * quiz3) + I(quiz1 *
##      quiz4) + I(quiz1 * covid1) + I(quiz1 * covid2) + I(quiz1 *
##      covid3) + I(quiz1 * covid4) + I(quiz1 * study1) + I(quiz1 *
##      study4) + I(quiz2 * quiz3) + I(quiz2 * quiz4) + I(quiz2 *
##      covid2) + I(quiz2 * study2) + I(quiz2 * study3) + I(quiz2 *
##      study4) + I(quiz3 * quiz4) + I(quiz3 * covid1) + I(quiz3 *
##      covid2) + I(quiz3 * covid3) + I(quiz3 * covid4) + I(quiz3 *
##      study1) + I(quiz3 * study3) + I(quiz4 * covid1) + I(quiz4 *
##      covid2) + I(quiz4 * covid3) + I(quiz4 * study1) + I(quiz4 *
##      study2) + I(quiz4 * study3) + I(covid1 * covid2) + I(covid1 *
##      covid3) + I(covid1 * covid4) + I(covid1 * study1) + I(covid1 *
##      study3) + I(covid1 * study4) + I(covid2 * covid3) + I(covid2 *
##      covid4) + I(covid2 * study3) + I(covid2 * study4) + I(covid3 *
##      covid4) + I(covid3 * study2) + I(covid3 * study3) + I(covid4 *
##      study2) + I(covid4 * study3) + I(study1 * study2) + I(study1 *
##      study3) + I(study1 * study4) + I(study2 * study3)
##
##
##              Df Sum of Sq    RSS    AIC
## - I(quiz3 * covid2)      1    0.01656 2.0932 -472.05
## - I(quiz3 * covid1)      1    0.02301 2.0997 -471.61
## - I(study1 * study2)      1    0.02470 2.1014 -471.50
## - study3                  1    0.02701 2.1037 -471.34
## <none>                    2.0767 -471.19
## - I(study1 * study3)      1    0.03339 2.1101 -470.91
## - I(covid2 * study3)      1    0.03639 2.1131 -470.70
## + I(quiz2 * covid4)       1    0.01941 2.0573 -470.53
## - I(quiz2 * study3)       1    0.04338 2.1200 -470.23
## - I(covid4 * study2)      1    0.04497 2.1216 -470.12
## - I(covid2 * covid4)      1    0.04666 2.1233 -470.01
## + I(quiz2 * covid1)       1    0.01161 2.0651 -469.99
## + I(covid4 * study4)      1    0.00898 2.0677 -469.81
## + I(quiz4 * covid4)       1    0.00767 2.0690 -469.72
## + I(covid4 * study1)      1    0.00752 2.0691 -469.71
## + I(quiz3 * study4)       1    0.00586 2.0708 -469.59
## - I(quiz2 * study4)       1    0.05407 2.1307 -469.51
## + I(quiz1 * study3)       1    0.00384 2.0728 -469.45
## + I(study2 * study4)      1    0.00285 2.0738 -469.38
## + I(covid2^2)             1    0.00226 2.0744 -469.34
## + I(study3^2)             1    0.00213 2.0745 -469.33
## + I(study3 * study4)      1    0.00131 2.0754 -469.28
## + I(covid3 * study4)      1    0.00073 2.0759 -469.24
## + I(quiz2 * study1)       1    0.00060 2.0761 -469.23
## + I(quiz2 * covid3)       1    0.00059 2.0761 -469.23
## + I(covid1 * study2)      1    0.00059 2.0761 -469.23
## + I(covid2 * study2)      1    0.00049 2.0762 -469.22
## + I(covid2 * study1)      1    0.00025 2.0764 -469.20
## + I(quiz1 * study2)       1    0.00015 2.0765 -469.20
## + I(quiz4 * study4)       1    0.00012 2.0765 -469.20

```

```

## + I(quiz3 * study2) 1 0.00003 2.0766 -469.19
## + I(covid3 * study1) 1 0.00000 2.0767 -469.19
## + study2 1 0.00000 2.0767 -469.19
## - I(quiz1^2) 1 0.06155 2.1382 -469.01
## - I(study1^2) 1 0.06209 2.1388 -468.97
## - I(covid1 * covid3) 1 0.06467 2.1413 -468.80
## - I(study2^2) 1 0.06672 2.1434 -468.67
## - I(quiz2^2) 1 0.06833 2.1450 -468.56
## - I(quiz2 * study2) 1 0.06987 2.1465 -468.46
## - quiz1 1 0.07198 2.1486 -468.32
## - I(quiz1 * study4) 1 0.07550 2.1522 -468.08
## - I(quiz4 * study2) 1 0.07552 2.1522 -468.08
## - I(covid1 * study3) 1 0.08231 2.1590 -467.63
## - I(covid3^2) 1 0.08839 2.1651 -467.23
## - I(covid3 * study2) 1 0.08845 2.1651 -467.22
## - I(quiz2 * covid2) 1 0.08941 2.1661 -467.16
## - I(quiz3^2) 1 0.08960 2.1663 -467.15
## - I(covid1 * study4) 1 0.09047 2.1671 -467.09
## - I(quiz3 * covid3) 1 0.09093 2.1676 -467.06
## - I(covid4 * study3) 1 0.09276 2.1694 -466.94
## - I(study2 * study3) 1 0.09736 2.1740 -466.64
## - I(quiz4 * covid1) 1 0.10464 2.1813 -466.16
## - I(quiz3 * study1) 1 0.10920 2.1859 -465.86
## - I(quiz3 * covid4) 1 0.11523 2.1919 -465.46
## - I(covid1 * covid2) 1 0.11847 2.1951 -465.25
## - I(quiz1 * covid4) 1 0.12053 2.1972 -465.12
## - quiz2 1 0.14369 2.2204 -463.62
## - I(covid3 * covid4) 1 0.17767 2.2543 -461.45
## - I(study1 * study4) 1 0.17863 2.2553 -461.39
## - I(study4^2) 1 0.18701 2.2637 -460.86
## - I(covid1^2) 1 0.20013 2.2768 -460.03
## - study1 1 0.24175 2.3184 -457.44
## - I(quiz1 * covid1) 1 0.25492 2.3316 -456.63
## - I(covid1 * covid4) 1 0.25605 2.3327 -456.56
## - I(covid1 * study1) 1 0.25625 2.3329 -456.55
## - I(covid4^2) 1 0.26183 2.3385 -456.21
## - I(quiz1 * quiz2) 1 0.26833 2.3450 -455.81
## - I(quiz1 * study1) 1 0.28288 2.3596 -454.93
## - study4 1 0.30358 2.3803 -453.68
## - I(covid2 * study4) 1 0.30912 2.3858 -453.34
## - I(quiz1 * covid3) 1 0.31483 2.3915 -453.00
## - covid4 1 0.31542 2.3921 -452.97
## - I(quiz1 * covid2) 1 0.31869 2.3954 -452.77
## - I(quiz4 * covid2) 1 0.34698 2.4236 -451.09
## - covid1 1 0.37681 2.4535 -449.34
## - I(quiz2 * quiz3) 1 0.39431 2.4710 -448.33
## - I(quiz3 * quiz4) 1 0.42823 2.5049 -446.38
## - quiz3 1 0.45294 2.5296 -444.97
## - I(quiz3 * study3) 1 0.50211 2.5788 -442.22
## - covid3 1 0.51987 2.5965 -441.24
## - I(quiz4 * covid3) 1 0.55606 2.6327 -439.26
## - covid2 1 0.55773 2.6344 -439.17
## - I(covid2 * covid3) 1 0.60028 2.6769 -436.88
## - I(quiz2 * quiz4) 1 0.60794 2.6846 -436.47

```



```

## - I(quiz4 * study1) 1 0.62104 2.6977 -435.77
## - I(quiz4 * study3) 1 0.69971 2.7764 -431.66
## - I(covid3 * study3) 1 0.80210 2.8788 -426.48
## - I(quiz1 * quiz3) 1 1.35327 3.4299 -401.43
## - I(quiz1 * quiz4) 1 2.23870 4.3154 -368.59
##
## Step: AIC=-472.05
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
## study1 + study3 + study4 + I(quiz1^2) + I(quiz2^2) + I(quiz3^2) +
## I(covid1^2) + I(covid3^2) + I(covid4^2) + I(study1^2) + I(study2^2) +
## I(study4^2) + I(quiz1 * quiz2) + I(quiz1 * quiz3) + I(quiz1 *
## quiz4) + I(quiz1 * covid1) + I(quiz1 * covid2) + I(quiz1 *
## covid3) + I(quiz1 * covid4) + I(quiz1 * study1) + I(quiz1 *
## study4) + I(quiz2 * quiz3) + I(quiz2 * quiz4) + I(quiz2 *
## covid2) + I(quiz2 * study2) + I(quiz2 * study3) + I(quiz2 *
## study4) + I(quiz3 * quiz4) + I(quiz3 * covid1) + I(quiz3 *
## covid3) + I(quiz3 * covid4) + I(quiz3 * study1) + I(quiz3 *
## study3) + I(quiz4 * covid1) + I(quiz4 * covid2) + I(quiz4 *
## covid3) + I(quiz4 * study1) + I(quiz4 * study2) + I(quiz4 *
## study3) + I(covid1 * covid2) + I(covid1 * covid3) + I(covid1 *
## covid4) + I(covid1 * study1) + I(covid1 * study3) + I(covid1 *
## study4) + I(covid2 * covid3) + I(covid2 * covid4) + I(covid2 *
## study3) + I(covid2 * study4) + I(covid3 * covid4) + I(covid3 *
## study2) + I(covid3 * study3) + I(covid4 * study2) + I(covid4 *
## study3) + I(study1 * study2) + I(study1 * study3) + I(study1 *
## study4) + I(study2 * study3)
##
##
## Df Sum of Sq RSS AIC
## - I(quiz3 * covid1) 1 0.00838 2.1016 -473.48
## - I(covid2 * study3) 1 0.02172 2.1150 -472.58
## - I(study1 * study3) 1 0.02610 2.1193 -472.28
## <none> 2.0932 -472.05
## - I(covid4 * study2) 1 0.03432 2.1276 -471.73
## - I(study1 * study2) 1 0.03732 2.1306 -471.52
## + I(quiz3 * covid2) 1 0.01656 2.0767 -471.19
## - study3 1 0.04383 2.1371 -471.09
## - I(covid2 * covid4) 1 0.04490 2.1381 -471.02
## + I(quiz2 * covid4) 1 0.01327 2.0800 -470.96
## - I(quiz2 * study4) 1 0.04671 2.1399 -470.90
## + I(covid4 * study4) 1 0.00958 2.0837 -470.71
## + I(covid4 * study1) 1 0.00877 2.0845 -470.65
## + I(quiz4 * covid4) 1 0.00653 2.0867 -470.50
## + I(quiz2 * covid1) 1 0.00649 2.0867 -470.50
## - I(study1^2) 1 0.05357 2.1468 -470.44
## - I(quiz2 * study3) 1 0.05533 2.1486 -470.32
## + I(quiz2 * study1) 1 0.00381 2.0894 -470.31
## + I(study3^2) 1 0.00378 2.0894 -470.31
## + I(covid1 * study2) 1 0.00364 2.0896 -470.30
## + I(covid2 * study2) 1 0.00332 2.0899 -470.28
## + I(quiz3 * study4) 1 0.00316 2.0901 -470.27
## + I(study2 * study4) 1 0.00295 2.0903 -470.25
## + I(quiz1 * study3) 1 0.00283 2.0904 -470.24
## + I(covid2^2) 1 0.00160 2.0916 -470.16
## + I(quiz1 * study2) 1 0.00159 2.0916 -470.16

```

```

## + I(covid2 * study1) 1 0.00131 2.0919 -470.14
## + I(study3 * study4) 1 0.00090 2.0923 -470.11
## + I(covid3 * study4) 1 0.00070 2.0925 -470.10
## - I(quiz1^2) 1 0.05888 2.1521 -470.08
## + I(quiz2 * covid3) 1 0.00042 2.0928 -470.08
## + I(quiz4 * study4) 1 0.00029 2.0929 -470.07
## + I(covid3 * study1) 1 0.00027 2.0930 -470.07
## + I(quiz3 * study2) 1 0.00018 2.0931 -470.06
## + study2 1 0.00007 2.0932 -470.06
## - I(covid1 * covid3) 1 0.05936 2.1526 -470.05
## - I(quiz2^2) 1 0.06136 2.1546 -469.92
## - quiz1 1 0.06353 2.1568 -469.78
## - I(quiz4 * study2) 1 0.06452 2.1577 -469.71
## - I(quiz1 * study4) 1 0.06629 2.1595 -469.59
## - I(quiz2 * study2) 1 0.06761 2.1608 -469.51
## - I(covid3 * study2) 1 0.07430 2.1675 -469.06
## - I(study2^2) 1 0.07749 2.1707 -468.85
## - I(study2 * study3) 1 0.08357 2.1768 -468.45
## - I(quiz3 * covid3) 1 0.08477 2.1780 -468.37
## - I(quiz2 * covid2) 1 0.08697 2.1802 -468.23
## - I(covid4 * study3) 1 0.09044 2.1837 -468.00
## - I(quiz4 * covid1) 1 0.09312 2.1864 -467.83
## - I(covid3^2) 1 0.09322 2.1864 -467.82
## - I(quiz3^2) 1 0.09531 2.1885 -467.68
## - I(covid1 * covid2) 1 0.10666 2.1999 -466.94
## - I(quiz1 * covid4) 1 0.10737 2.2006 -466.90
## - I(covid1 * study4) 1 0.11039 2.2036 -466.70
## - I(quiz3 * study1) 1 0.11639 2.2096 -466.31
## - quiz2 1 0.13037 2.2236 -465.41
## - I(covid1 * study3) 1 0.15155 2.2448 -464.06
## - I(quiz3 * covid4) 1 0.15970 2.2529 -463.54
## - I(study1 * study4) 1 0.18192 2.2752 -462.13
## - I(study4^2) 1 0.18312 2.2764 -462.06
## - I(covid1^2) 1 0.18385 2.2771 -462.01
## - I(covid3 * covid4) 1 0.20341 2.2966 -460.79
## - I(covid1 * covid4) 1 0.24684 2.3401 -458.11
## - study1 1 0.25080 2.3440 -457.87
## - I(covid1 * study1) 1 0.25316 2.3464 -457.73
## - I(quiz1 * covid1) 1 0.25769 2.3509 -457.45
## - I(quiz1 * quiz2) 1 0.26276 2.3560 -457.14
## - I(quiz1 * study1) 1 0.27217 2.3654 -456.57
## - study4 1 0.28736 2.3806 -455.66
## - I(covid2 * study4) 1 0.29382 2.3870 -455.27
## - I(quiz1 * covid3) 1 0.30085 2.3941 -454.85
## - I(quiz1 * covid2) 1 0.30364 2.3969 -454.68
## - I(covid4^2) 1 0.34375 2.4370 -452.31
## - covid4 1 0.34999 2.4432 -451.94
## - I(quiz4 * covid2) 1 0.38589 2.4791 -449.86
## - covid1 1 0.40543 2.4987 -448.73
## - I(quiz2 * quiz3) 1 0.41792 2.5112 -448.02
## - quiz3 1 0.43755 2.5308 -446.91
## - I(quiz3 * quiz4) 1 0.44767 2.5409 -446.34
## - I(quiz3 * study3) 1 0.50583 2.5991 -443.10
## - I(quiz4 * covid3) 1 0.54657 2.6398 -440.88

```

```

## - covid3          1    0.58123 2.6745 -439.01
## - I(covid2 * covid3) 1    0.58481 2.6780 -438.82
## - I(quiz4 * study1)  1    0.63638 2.7296 -436.09
## - I(quiz2 * quiz4)   1    0.64666 2.7399 -435.55
## - covid2            1    0.72226 2.8155 -431.66
## - I(quiz4 * study3)  1    0.77435 2.8676 -429.04
## - I(covid3 * study3) 1    0.89814 2.9914 -423.00
## - I(quiz1 * quiz3)   1    1.35451 3.4477 -402.69
## - I(quiz1 * quiz4)   1    2.22448 4.3177 -370.52
##
## Step:  AIC=-473.48
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
##   study1 + study3 + study4 + I(quiz1^2) + I(quiz2^2) + I(quiz3^2) +
##   I(covid1^2) + I(covid3^2) + I(covid4^2) + I(study1^2) + I(study2^2) +
##   I(study4^2) + I(quiz1 * quiz2) + I(quiz1 * quiz3) + I(quiz1 *
##   quiz4) + I(quiz1 * covid1) + I(quiz1 * covid2) + I(quiz1 *
##   covid3) + I(quiz1 * covid4) + I(quiz1 * study1) + I(quiz1 *
##   study4) + I(quiz2 * quiz3) + I(quiz2 * quiz4) + I(quiz2 *
##   covid2) + I(quiz2 * study2) + I(quiz2 * study3) + I(quiz2 *
##   study4) + I(quiz3 * quiz4) + I(quiz3 * covid3) + I(quiz3 *
##   covid4) + I(quiz3 * study1) + I(quiz3 * study3) + I(quiz4 *
##   covid1) + I(quiz4 * covid2) + I(quiz4 * covid3) + I(quiz4 *
##   study1) + I(quiz4 * study2) + I(quiz4 * study3) + I(covid1 *
##   covid2) + I(covid1 * covid3) + I(covid1 * covid4) + I(covid1 *
##   study1) + I(covid1 * study3) + I(covid1 * study4) + I(covid2 *
##   covid3) + I(covid2 * covid4) + I(covid2 * study3) + I(covid2 *
##   study4) + I(covid3 * covid4) + I(covid3 * study2) + I(covid3 *
##   study3) + I(covid4 * study2) + I(covid4 * study3) + I(study1 *
##   study2) + I(study1 * study3) + I(study1 * study4) + I(study2 *
##   study3)
##
##              Df Sum of Sq    RSS    AIC
## - I(covid2 * study3)  1    0.01882 2.1204 -474.20
## <none>                                2.1016 -473.48
## - I(study1 * study3)  1    0.03258 2.1342 -473.28
## - I(study1 * study2)  1    0.03363 2.1352 -473.21
## - study3              1    0.03621 2.1378 -473.04
## + I(quiz2 * covid4)   1    0.01716 2.0845 -472.65
## + I(covid4 * study1)  1    0.01336 2.0883 -472.39
## - I(covid2 * covid4)  1    0.04697 2.1486 -472.32
## + I(quiz4 * covid4)   1    0.01131 2.0903 -472.25
## - I(covid4 * study2)  1    0.04804 2.1497 -472.25
## + I(covid4 * study4)  1    0.01004 2.0916 -472.16
## - I(quiz2 * study4)   1    0.05047 2.1521 -472.09
## + I(quiz3 * covid1)   1    0.00838 2.0932 -472.05
## + I(covid1 * study2)  1    0.00780 2.0938 -472.01
## - I(quiz1^2)          1    0.05220 2.1538 -471.97
## - I(quiz2 * study3)   1    0.05367 2.1553 -471.87
## + I(quiz3 * study4)   1    0.00444 2.0972 -471.78
## - quiz1               1    0.05517 2.1568 -471.77
## + I(quiz2 * covid1)   1    0.00395 2.0977 -471.75
## + I(quiz2 * study1)   1    0.00376 2.0979 -471.74
## + I(quiz1 * study3)   1    0.00376 2.0979 -471.74
## + I(covid2 * study2)  1    0.00352 2.0981 -471.72

```

```

## + I(covid2 * study1) 1 0.00261 2.0990 -471.66
## + I(covid3 * study4) 1 0.00257 2.0990 -471.65
## + I(quiz3 * covid2) 1 0.00193 2.0997 -471.61
## + I(covid3 * study1) 1 0.00180 2.0998 -471.60
## + I(quiz1 * study2) 1 0.00154 2.1001 -471.58
## + I(study3^2) 1 0.00111 2.1005 -471.56
## + I(quiz4 * study4) 1 0.00105 2.1006 -471.55
## + I(study2 * study4) 1 0.00069 2.1009 -471.53
## + I(study3 * study4) 1 0.00047 2.1011 -471.51
## + I(quiz2 * covid3) 1 0.00045 2.1012 -471.51
## + I(quiz3 * study2) 1 0.00041 2.1012 -471.51
## + I(covid2^2) 1 0.00024 2.1014 -471.50
## + study2 1 0.00000 2.1016 -471.48
## - I(quiz1 * study4) 1 0.06604 2.1677 -471.06
## - I(study1^2) 1 0.06631 2.1679 -471.04
## - I(quiz2^2) 1 0.06993 2.1715 -470.80
## - I(quiz2 * study2) 1 0.07400 2.1756 -470.53
## - I(quiz4 * study2) 1 0.07414 2.1758 -470.52
## - I(study2^2) 1 0.07679 2.1784 -470.35
## - I(quiz3 * covid3) 1 0.08267 2.1843 -469.96
## - I(covid3 * study2) 1 0.08419 2.1858 -469.86
## - I(covid3^2) 1 0.08590 2.1875 -469.75
## - I(quiz2 * covid2) 1 0.09241 2.1940 -469.33
## - I(quiz4 * covid1) 1 0.09453 2.1961 -469.19
## - I(study2 * study3) 1 0.09463 2.1962 -469.18
## - I(covid1 * covid3) 1 0.09590 2.1975 -469.10
## - I(quiz3^2) 1 0.10135 2.2030 -468.75
## - I(covid1 * covid2) 1 0.10303 2.2046 -468.64
## - I(covid4 * study3) 1 0.10687 2.2085 -468.39
## - I(covid1 * study4) 1 0.10869 2.2103 -468.27
## - I(quiz1 * covid4) 1 0.11047 2.2121 -468.15
## - quiz2 1 0.13637 2.2380 -466.49
## - I(quiz3 * covid4) 1 0.15132 2.2529 -465.54
## - I(covid1 * study3) 1 0.15591 2.2575 -465.25
## - I(study1 * study4) 1 0.17367 2.2753 -464.13
## - I(study4^2) 1 0.18621 2.2878 -463.34
## - I(quiz3 * study1) 1 0.18938 2.2910 -463.14
## - I(covid3 * covid4) 1 0.19592 2.2975 -462.73
## - I(covid1^2) 1 0.21086 2.3125 -461.81
## - study1 1 0.24250 2.3441 -459.86
## - I(covid1 * study1) 1 0.24664 2.3483 -459.61
## - I(quiz1 * quiz2) 1 0.25706 2.3587 -458.98
## - I(quiz1 * covid1) 1 0.26575 2.3674 -458.45
## - I(quiz1 * study1) 1 0.28125 2.3829 -457.52
## - study4 1 0.28668 2.3883 -457.19
## - I(quiz1 * covid3) 1 0.29604 2.3977 -456.63
## - I(covid2 * study4) 1 0.30186 2.4035 -456.29
## - I(covid1 * covid4) 1 0.30219 2.4038 -456.27
## - I(quiz1 * covid2) 1 0.31744 2.4191 -455.36
## - I(covid4^2) 1 0.34344 2.4451 -453.84
## - covid4 1 0.34471 2.4463 -453.76
## - I(quiz4 * covid2) 1 0.38075 2.4824 -451.67
## - covid1 1 0.42123 2.5228 -449.36
## - quiz3 1 0.43654 2.5382 -448.49

```

```

## - I(quiz3 * quiz4)      1    0.44536 2.5470 -448.00
## - I(quiz2 * quiz3)      1    0.47975 2.5814 -446.08
## - I(quiz4 * covid3)     1    0.55457 2.6562 -441.99
## - I(covid2 * covid3)    1    0.57652 2.6781 -440.81
## - covid3                 1    0.58729 2.6889 -440.24
## - I(quiz2 * quiz4)      1    0.67213 2.7737 -435.80
## - I(quiz3 * study3)     1    0.68540 2.7870 -435.12
## - covid2                 1    0.71697 2.8186 -433.51
## - I(quiz4 * study1)     1    0.74497 2.8466 -432.09
## - I(quiz4 * study3)     1    0.78228 2.8839 -430.23
## - I(covid3 * study3)    1    0.97342 3.0750 -421.05
## - I(quiz1 * quiz3)      1    1.46862 3.5702 -399.70
## - I(quiz1 * quiz4)      1    2.23411 4.3357 -371.92
##
## Step: AIC=-474.2
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
##   study1 + study3 + study4 + I(quiz1^2) + I(quiz2^2) + I(quiz3^2) +
##   I(covid1^2) + I(covid3^2) + I(covid4^2) + I(study1^2) + I(study2^2) +
##   I(study4^2) + I(quiz1 * quiz2) + I(quiz1 * quiz3) + I(quiz1 *
##   quiz4) + I(quiz1 * covid1) + I(quiz1 * covid2) + I(quiz1 *
##   covid3) + I(quiz1 * covid4) + I(quiz1 * study1) + I(quiz1 *
##   study4) + I(quiz2 * quiz3) + I(quiz2 * quiz4) + I(quiz2 *
##   covid2) + I(quiz2 * study2) + I(quiz2 * study3) + I(quiz2 *
##   study4) + I(quiz3 * quiz4) + I(quiz3 * covid3) + I(quiz3 *
##   covid4) + I(quiz3 * study1) + I(quiz3 * study3) + I(quiz4 *
##   covid1) + I(quiz4 * covid2) + I(quiz4 * covid3) + I(quiz4 *
##   study1) + I(quiz4 * study2) + I(quiz4 * study3) + I(covid1 *
##   covid2) + I(covid1 * covid3) + I(covid1 * covid4) + I(covid1 *
##   study1) + I(covid1 * study3) + I(covid1 * study4) + I(covid2 *
##   covid3) + I(covid2 * covid4) + I(covid2 * study4) + I(covid3 *
##   covid4) + I(covid3 * study2) + I(covid3 * study3) + I(covid4 *
##   study2) + I(covid4 * study3) + I(study1 * study2) + I(study1 *
##   study3) + I(study1 * study4) + I(study2 * study3)
##
##
##           Df Sum of Sq    RSS    AIC
## - I(study1 * study2)  1    0.02986 2.1503 -474.21
## <none>                                2.1204 -474.20
## - I(study1 * study3)  1    0.03163 2.1521 -474.09
## - study3              1    0.03341 2.1538 -473.97
## + I(covid2 * study2)  1    0.02026 2.1002 -473.58
## + I(covid2 * study3)  1    0.01882 2.1016 -473.48
## - I(quiz2 * study4)   1    0.04449 2.1649 -473.24
## + I(covid4 * study4)  1    0.01459 2.1058 -473.19
## + I(covid2 * study1)  1    0.01324 2.1072 -473.10
## - I(quiz1^2)          1    0.04779 2.1682 -473.02
## - quiz1               1    0.04908 2.1695 -472.93
## + I(covid3 * study4)  1    0.00991 2.1105 -472.87
## + I(quiz2 * covid4)   1    0.00816 2.1123 -472.76
## + I(quiz4 * covid4)   1    0.00584 2.1146 -472.60
## + I(quiz3 * covid1)   1    0.00548 2.1150 -472.58
## + I(covid4 * study1)  1    0.00478 2.1157 -472.53
## - I(covid2 * covid4)  1    0.05551 2.1760 -472.51
## + I(covid1 * study2)  1    0.00450 2.1159 -472.51
## - I(covid4 * study2)  1    0.05673 2.1772 -472.43

```

```

## + I(quiz1 * study3) 1 0.00328 2.1172 -472.43
## + I(quiz1 * study2) 1 0.00306 2.1174 -472.41
## + I(quiz3 * study4) 1 0.00275 2.1177 -472.39
## + I(quiz2 * study1) 1 0.00232 2.1181 -472.36
## + I(study3^2) 1 0.00145 2.1190 -472.30
## + I(quiz3 * study2) 1 0.00127 2.1192 -472.29
## + I(quiz4 * study4) 1 0.00101 2.1194 -472.27
## + I(study3 * study4) 1 0.00083 2.1196 -472.26
## + I(covid3 * study1) 1 0.00075 2.1197 -472.26
## + I(covid2^2) 1 0.00031 2.1201 -472.23
## + I(quiz2 * covid1) 1 0.00016 2.1203 -472.22
## + I(study2 * study4) 1 0.00016 2.1203 -472.22
## + study2 1 0.00009 2.1203 -472.21
## + I(quiz2 * covid3) 1 0.00002 2.1204 -472.21
## + I(quiz3 * covid2) 1 0.00001 2.1204 -472.21
## - I(quiz2 * study3) 1 0.06659 2.1870 -471.78
## - I(quiz2^2) 1 0.06937 2.1898 -471.60
## - I(study2^2) 1 0.07622 2.1967 -471.15
## - I(quiz4 * study2) 1 0.07753 2.1980 -471.07
## - I(covid3 * study2) 1 0.07770 2.1981 -471.06
## - I(quiz4 * covid1) 1 0.07908 2.1995 -470.97
## - I(quiz1 * study4) 1 0.07934 2.1998 -470.95
## - I(study1^2) 1 0.07948 2.1999 -470.94
## - I(quiz2 * study2) 1 0.08014 2.2006 -470.90
## - I(quiz3 * covid3) 1 0.08033 2.2008 -470.89
## - I(covid1 * covid3) 1 0.08674 2.2072 -470.47
## - I(covid3^2) 1 0.09031 2.2108 -470.24
## - I(study2 * study3) 1 0.09300 2.2134 -470.07
## - I(quiz1 * covid4) 1 0.09423 2.2147 -469.99
## - I(quiz3^2) 1 0.09989 2.2203 -469.62
## - I(quiz2 * covid2) 1 0.10388 2.2243 -469.37
## - I(covid1 * study4) 1 0.11300 2.2334 -468.78
## - quiz2 1 0.12722 2.2477 -467.87
## - I(covid1 * covid2) 1 0.14117 2.2616 -466.99
## - I(covid4 * study3) 1 0.14287 2.2633 -466.88
## - I(quiz3 * covid4) 1 0.14881 2.2692 -466.51
## - I(covid1 * study3) 1 0.16228 2.2827 -465.66
## - I(study1 * study4) 1 0.16768 2.2881 -465.32
## - I(study4^2) 1 0.17846 2.2989 -464.65
## - I(covid3 * covid4) 1 0.18825 2.3087 -464.04
## - I(quiz3 * study1) 1 0.21504 2.3355 -462.39
## - I(covid1 * study1) 1 0.23775 2.3582 -461.01
## - study1 1 0.24000 2.3604 -460.87
## - I(quiz1 * quiz2) 1 0.24289 2.3633 -460.70
## - I(quiz1 * covid1) 1 0.25737 2.3778 -459.82
## - I(covid1^2) 1 0.27050 2.3909 -459.04
## - I(quiz1 * covid3) 1 0.27840 2.3988 -458.56
## - I(quiz1 * study1) 1 0.28151 2.4020 -458.38
## - study4 1 0.29184 2.4123 -457.77
## - I(covid1 * covid4) 1 0.29466 2.4151 -457.60
## - I(quiz1 * covid2) 1 0.30425 2.4247 -457.03
## - covid4 1 0.32603 2.4465 -455.75
## - I(covid4^2) 1 0.36613 2.4866 -453.43
## - I(quiz4 * covid2) 1 0.39381 2.5142 -451.84

```

```

## - covid1          1    0.40376 2.5242 -451.28
## - I(quiz3 * quiz4) 1    0.44722 2.5677 -448.84
## - quiz3           1    0.45495 2.5754 -448.41
## - I(covid2 * study4) 1    0.47949 2.5999 -447.05
## - I(quiz2 * quiz3)  1    0.50284 2.6233 -445.77
## - I(quiz4 * covid3) 1    0.54419 2.6646 -443.54
## - I(covid2 * covid3) 1    0.57126 2.6917 -442.09
## - covid3          1    0.58773 2.7082 -441.22
## - I(quiz2 * quiz4)  1    0.70710 2.8275 -435.05
## - covid2          1    0.72503 2.8455 -434.15
## - I(quiz3 * study3) 1    0.77750 2.8979 -431.53
## - I(quiz4 * study1) 1    0.78458 2.9050 -431.19
## - I(quiz4 * study3) 1    0.80328 2.9237 -430.27
## - I(covid3 * study3) 1    1.07554 3.1960 -417.54
## - I(quiz1 * quiz3)  1    1.46022 3.5807 -401.28
## - I(quiz1 * quiz4)  1    2.23179 4.3522 -373.38
##
## Step: AIC=-474.21
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
##   study1 + study3 + study4 + I(quiz1^2) + I(quiz2^2) + I(quiz3^2) +
##   I(covid1^2) + I(covid3^2) + I(covid4^2) + I(study1^2) + I(study2^2) +
##   I(study4^2) + I(quiz1 * quiz2) + I(quiz1 * quiz3) + I(quiz1 *
##   quiz4) + I(quiz1 * covid1) + I(quiz1 * covid2) + I(quiz1 *
##   covid3) + I(quiz1 * covid4) + I(quiz1 * study1) + I(quiz1 *
##   study4) + I(quiz2 * quiz3) + I(quiz2 * quiz4) + I(quiz2 *
##   covid2) + I(quiz2 * study2) + I(quiz2 * study3) + I(quiz2 *
##   study4) + I(quiz3 * quiz4) + I(quiz3 * covid3) + I(quiz3 *
##   covid4) + I(quiz3 * study1) + I(quiz3 * study3) + I(quiz4 *
##   covid1) + I(quiz4 * covid2) + I(quiz4 * covid3) + I(quiz4 *
##   study1) + I(quiz4 * study2) + I(quiz4 * study3) + I(covid1 *
##   covid2) + I(covid1 * covid3) + I(covid1 * covid4) + I(covid1 *
##   study1) + I(covid1 * study3) + I(covid1 * study4) + I(covid2 *
##   covid3) + I(covid2 * covid4) + I(covid2 * study4) + I(covid3 *
##   covid4) + I(covid3 * study2) + I(covid3 * study3) + I(covid4 *
##   study2) + I(covid4 * study3) + I(study1 * study3) + I(study1 *
##   study4) + I(study2 * study3)
##
##              Df Sum of Sq    RSS    AIC
## - study3          1    0.02013 2.1704 -474.87
## - I(quiz2 * study4) 1    0.02905 2.1793 -474.29
## <none>                        2.1503 -474.21
## + I(study1 * study2) 1    0.02986 2.1204 -474.20
## - I(study1 * study3) 1    0.03071 2.1810 -474.18
## - quiz1            1    0.03535 2.1856 -473.87
## - I(covid2 * covid4) 1    0.03679 2.1871 -473.78
## - I(quiz1^2)        1    0.03723 2.1875 -473.75
## + I(covid2 * study2) 1    0.02280 2.1275 -473.73
## + I(covid4 * study4) 1    0.01954 2.1308 -473.51
## + I(covid2 * study3) 1    0.01505 2.1352 -473.21
## - I(study2^2)        1    0.04670 2.1970 -473.13
## + I(covid3 * study4) 1    0.00997 2.1403 -472.87
## + I(covid4 * study1) 1    0.00885 2.1414 -472.80
## + I(quiz2 * covid4)  1    0.00880 2.1415 -472.79
## + I(covid2 * study1) 1    0.00867 2.1416 -472.78

```

```

## + I(quiz1 * study3) 1 0.00626 2.1440 -472.62
## + I(covid3 * study1) 1 0.00602 2.1443 -472.61
## + I(quiz4 * covid4) 1 0.00570 2.1446 -472.59
## + I(quiz3 * study4) 1 0.00439 2.1459 -472.50
## + I(study3 * study4) 1 0.00394 2.1464 -472.47
## + I(quiz4 * study4) 1 0.00390 2.1464 -472.47
## + I(study3^2) 1 0.00363 2.1467 -472.45
## + I(quiz3 * covid1) 1 0.00295 2.1473 -472.40
## + I(quiz3 * study2) 1 0.00219 2.1481 -472.35
## + I(quiz1 * study2) 1 0.00211 2.1482 -472.35
## + I(quiz3 * covid2) 1 0.00189 2.1484 -472.33
## + study2 1 0.00167 2.1486 -472.32
## + I(covid1 * study2) 1 0.00122 2.1491 -472.29
## + I(quiz2 * covid1) 1 0.00099 2.1493 -472.27
## + I(quiz2 * study1) 1 0.00035 2.1499 -472.23
## + I(quiz2 * covid3) 1 0.00029 2.1500 -472.22
## + I(covid2^2) 1 0.00004 2.1503 -472.21
## + I(study2 * study4) 1 0.00000 2.1503 -472.21
## - I(quiz3 * covid3) 1 0.06496 2.2153 -471.95
## - I(covid4 * study2) 1 0.07398 2.2243 -471.37
## - I(quiz2^2) 1 0.07666 2.2270 -471.20
## - I(covid3^2) 1 0.07833 2.2286 -471.09
## - I(quiz2 * covid2) 1 0.08212 2.2324 -470.85
## - I(quiz1 * study4) 1 0.09041 2.2407 -470.32
## - I(covid1 * covid3) 1 0.09050 2.2408 -470.31
## - I(quiz2 * study2) 1 0.09273 2.2430 -470.17
## - I(quiz2 * study3) 1 0.09354 2.2438 -470.12
## - I(quiz4 * covid1) 1 0.09447 2.2448 -470.06
## - I(covid3 * study2) 1 0.09688 2.2472 -469.90
## - I(quiz1 * covid4) 1 0.10149 2.2518 -469.61
## - I(covid1 * study4) 1 0.11082 2.2611 -469.02
## - I(quiz4 * study2) 1 0.11234 2.2626 -468.92
## - I(quiz3^2) 1 0.11537 2.2657 -468.73
## - I(study1^2) 1 0.11538 2.2657 -468.73
## - I(covid1 * study3) 1 0.13729 2.2876 -467.35
## - I(quiz3 * covid4) 1 0.13774 2.2880 -467.33
## - I(study2 * study3) 1 0.13914 2.2894 -467.24
## - I(study1 * study4) 1 0.14077 2.2911 -467.14
## - I(covid4 * study3) 1 0.14944 2.2997 -466.60
## - quiz2 1 0.15077 2.3011 -466.51
## - I(study4^2) 1 0.16396 2.3143 -465.70
## - I(covid1 * covid2) 1 0.18264 2.3329 -464.55
## - I(covid3 * covid4) 1 0.19780 2.3481 -463.62
## - I(covid1 * study1) 1 0.22136 2.3717 -462.19
## - I(quiz1 * covid1) 1 0.22814 2.3784 -461.79
## - I(quiz3 * study1) 1 0.23041 2.3807 -461.65
## - study1 1 0.23738 2.3877 -461.23
## - I(quiz1 * quiz2) 1 0.24829 2.3986 -460.58
## - I(quiz1 * study1) 1 0.25272 2.4030 -460.32
## - study4 1 0.26518 2.4155 -459.58
## - I(quiz1 * covid3) 1 0.27037 2.4207 -459.27
## - I(covid1 * covid4) 1 0.30722 2.4575 -457.11
## - covid4 1 0.30732 2.4576 -457.10
## - I(covid4^2) 1 0.33707 2.4874 -455.38

```



```

## - I(covid1^2)      1  0.35549 2.5058 -454.33
## - I(quiz1 * covid2) 1  0.36663 2.5169 -453.69
## - covid1           1  0.37805 2.5283 -453.05
## - I(quiz4 * covid2) 1  0.39834 2.5486 -451.90
## - quiz3            1  0.43491 2.5852 -449.86
## - I(quiz3 * quiz4)  1  0.44888 2.5992 -449.09
## - I(covid2 * study4) 1  0.47528 2.6256 -447.65
## - I(quiz2 * quiz3)  1  0.49047 2.6408 -446.82
## - I(covid2 * covid3) 1  0.54511 2.6954 -443.90
## - I(quiz4 * covid3)  1  0.54732 2.6976 -443.78
## - covid3           1  0.67687 2.8272 -437.07
## - I(quiz2 * quiz4)  1  0.67863 2.8289 -436.98
## - covid2           1  0.74167 2.8920 -433.83
## - I(quiz4 * study1)  1  0.75954 2.9098 -432.95
## - I(quiz4 * study3)  1  0.77421 2.9245 -432.23
## - I(quiz3 * study3)  1  0.82375 2.9740 -429.83
## - I(covid3 * study3) 1  1.04570 3.1960 -419.54
## - I(quiz1 * quiz3)   1  1.49506 3.6454 -400.72
## - I(quiz1 * quiz4)   1  2.26385 4.4141 -373.36
##
## Step: AIC=-474.87
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
##   study1 + study4 + I(quiz1^2) + I(quiz2^2) + I(quiz3^2) +
##   I(covid1^2) + I(covid3^2) + I(covid4^2) + I(study1^2) + I(study2^2) +
##   I(study4^2) + I(quiz1 * quiz2) + I(quiz1 * quiz3) + I(quiz1 *
##   quiz4) + I(quiz1 * covid1) + I(quiz1 * covid2) + I(quiz1 *
##   covid3) + I(quiz1 * covid4) + I(quiz1 * study1) + I(quiz1 *
##   study4) + I(quiz2 * quiz3) + I(quiz2 * quiz4) + I(quiz2 *
##   covid2) + I(quiz2 * study2) + I(quiz2 * study3) + I(quiz2 *
##   study4) + I(quiz3 * quiz4) + I(quiz3 * covid3) + I(quiz3 *
##   covid4) + I(quiz3 * study1) + I(quiz3 * study3) + I(quiz4 *
##   covid1) + I(quiz4 * covid2) + I(quiz4 * covid3) + I(quiz4 *
##   study1) + I(quiz4 * study2) + I(quiz4 * study3) + I(covid1 *
##   covid2) + I(covid1 * covid3) + I(covid1 * covid4) + I(covid1 *
##   study1) + I(covid1 * study3) + I(covid1 * study4) + I(covid2 *
##   covid3) + I(covid2 * covid4) + I(covid2 * study4) + I(covid3 *
##   covid4) + I(covid3 * study2) + I(covid3 * study3) + I(covid4 *
##   study2) + I(covid4 * study3) + I(study1 * study3) + I(study1 *
##   study4) + I(study2 * study3)
##
##           Df Sum of Sq  RSS    AIC
## - quiz1      1  0.02849 2.1989 -475.01
## <none>                2.1704 -474.87
## + I(covid2 * study2) 1  0.02570 2.1447 -474.58
## - I(study1 * study3) 1  0.03528 2.2057 -474.57
## - I(quiz1^2)        1  0.03860 2.2090 -474.35
## + study3            1  0.02013 2.1503 -474.21
## + I(study1 * study2) 1  0.01657 2.1538 -473.97
## + I(covid2 * study3) 1  0.01379 2.1566 -473.78
## + I(quiz1 * study2)  1  0.01299 2.1574 -473.73
## + I(covid4 * study4) 1  0.01026 2.1602 -473.55
## + I(covid3 * study4) 1  0.01008 2.1603 -473.54
## + I(covid2 * study1) 1  0.00989 2.1605 -473.53
## - I(study2^2)      1  0.05279 2.2232 -473.44

```

```

## + I(quiz3 * covid2) 1 0.00804 2.1624 -473.40
## + I(covid3 * study1) 1 0.00643 2.1640 -473.30
## + I(quiz3 * study2) 1 0.00379 2.1666 -473.12
## + I(study2 * study4) 1 0.00364 2.1668 -473.11
## + study2 1 0.00307 2.1674 -473.08
## - I(covid2 * covid4) 1 0.05868 2.2291 -473.06
## + I(covid2^2) 1 0.00241 2.1680 -473.03
## + I(study3 * study4) 1 0.00227 2.1681 -473.02
## + I(covid1 * study2) 1 0.00204 2.1684 -473.01
## + I(quiz2 * covid4) 1 0.00189 2.1685 -473.00
## + I(quiz2 * covid3) 1 0.00163 2.1688 -472.98
## + I(study3^2) 1 0.00132 2.1691 -472.96
## + I(quiz4 * covid4) 1 0.00080 2.1696 -472.93
## + I(quiz2 * covid1) 1 0.00064 2.1698 -472.92
## + I(covid4 * study1) 1 0.00060 2.1698 -472.91
## + I(quiz4 * study4) 1 0.00040 2.1700 -472.90
## + I(quiz3 * covid1) 1 0.00013 2.1703 -472.88
## + I(quiz2 * study1) 1 0.00012 2.1703 -472.88
## + I(quiz1 * study3) 1 0.00000 2.1704 -472.87
## + I(quiz3 * study4) 1 0.00000 2.1704 -472.87
## - I(quiz3 * covid3) 1 0.07143 2.2418 -472.24
## - I(quiz2 * study4) 1 0.07282 2.2432 -472.15
## - I(quiz2 * study3) 1 0.07512 2.2455 -472.01
## - I(covid4 * study2) 1 0.07722 2.2476 -471.87
## - I(quiz2^2) 1 0.07822 2.2486 -471.81
## - I(quiz2 * covid2) 1 0.08391 2.2543 -471.45
## - I(covid3 * study2) 1 0.08656 2.2570 -471.28
## - I(covid3^2) 1 0.08858 2.2590 -471.15
## - I(quiz2 * study2) 1 0.09459 2.2650 -470.77
## - I(quiz1 * study4) 1 0.09899 2.2694 -470.50
## - I(quiz3^2) 1 0.10552 2.2759 -470.08
## - I(quiz1 * covid4) 1 0.10767 2.2781 -469.95
## - I(study1^2) 1 0.10850 2.2789 -469.90
## - I(covid1 * study4) 1 0.11374 2.2842 -469.57
## - I(quiz4 * covid1) 1 0.11613 2.2865 -469.42
## - I(covid1 * study3) 1 0.12251 2.2929 -469.02
## - I(covid4 * study3) 1 0.13505 2.3055 -468.24
## - I(covid1 * covid3) 1 0.13985 2.3103 -467.94
## - I(quiz4 * study2) 1 0.14594 2.3164 -467.57
## - quiz2 1 0.14868 2.3191 -467.40
## - I(study4^2) 1 0.15608 2.3265 -466.94
## - I(study1 * study4) 1 0.15639 2.3268 -466.92
## - I(quiz3 * covid4) 1 0.17009 2.3405 -466.08
## - I(covid1 * covid2) 1 0.17169 2.3421 -465.99
## - I(covid3 * covid4) 1 0.17784 2.3483 -465.61
## - I(study2 * study3) 1 0.19873 2.3691 -464.35
## - I(covid1 * study1) 1 0.20672 2.3771 -463.86
## - study1 1 0.22320 2.3936 -462.88
## - I(quiz1 * covid1) 1 0.22697 2.3974 -462.65
## - I(quiz3 * study1) 1 0.23564 2.4061 -462.13
## - I(quiz1 * quiz2) 1 0.24509 2.4155 -461.57
## - I(quiz1 * covid3) 1 0.28138 2.4518 -459.44
## - I(quiz1 * study1) 1 0.30816 2.4786 -457.89
## - I(covid4^2) 1 0.31831 2.4887 -457.30

```

```

## - I(covid1 * covid4) 1 0.33307 2.5035 -456.46
## - covid4 1 0.33866 2.5091 -456.14
## - study4 1 0.36781 2.5382 -454.49
## - I(quiz1 * covid2) 1 0.37060 2.5410 -454.33
## - I(covid1^2) 1 0.38886 2.5593 -453.31
## - covid1 1 0.40246 2.5729 -452.55
## - I(quiz4 * covid2) 1 0.40688 2.5773 -452.30
## - I(quiz3 * quiz4) 1 0.46907 2.6395 -448.89
## - quiz3 1 0.50249 2.6729 -447.09
## - I(quiz4 * covid3) 1 0.52811 2.6985 -445.73
## - I(quiz2 * quiz3) 1 0.53536 2.7058 -445.35
## - I(covid2 * study4) 1 0.55300 2.7234 -444.42
## - I(covid2 * covid3) 1 0.59846 2.7689 -442.05
## - covid3 1 0.65676 2.8272 -439.07
## - I(quiz2 * quiz4) 1 0.72398 2.8944 -435.71
## - I(quiz4 * study1) 1 0.73948 2.9099 -434.95
## - covid2 1 0.74408 2.9145 -434.72
## - I(quiz4 * study3) 1 0.82532 2.9957 -430.79
## - I(quiz3 * study3) 1 0.98898 3.1594 -423.18
## - I(covid3 * study3) 1 1.07495 3.2454 -419.34
## - I(quiz1 * quiz3) 1 1.50967 3.6801 -401.37
## - I(quiz1 * quiz4) 1 2.25538 4.4258 -374.98
##
## Step: AIC=-475.01
## quiz4 ~ quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 + study1 +
## study4 + I(quiz1^2) + I(quiz2^2) + I(quiz3^2) + I(covid1^2) +
## I(covid3^2) + I(covid4^2) + I(study1^2) + I(study2^2) + I(study4^2) +
## I(quiz1 * quiz2) + I(quiz1 * quiz3) + I(quiz1 * quiz4) +
## I(quiz1 * covid1) + I(quiz1 * covid2) + I(quiz1 * covid3) +
## I(quiz1 * covid4) + I(quiz1 * study1) + I(quiz1 * study4) +
## I(quiz2 * quiz3) + I(quiz2 * quiz4) + I(quiz2 * covid2) +
## I(quiz2 * study2) + I(quiz2 * study3) + I(quiz2 * study4) +
## I(quiz3 * quiz4) + I(quiz3 * covid3) + I(quiz3 * covid4) +
## I(quiz3 * study1) + I(quiz3 * study3) + I(quiz4 * covid1) +
## I(quiz4 * covid2) + I(quiz4 * covid3) + I(quiz4 * study1) +
## I(quiz4 * study2) + I(quiz4 * study3) + I(covid1 * covid2) +
## I(covid1 * covid3) + I(covid1 * covid4) + I(covid1 * study1) +
## I(covid1 * study3) + I(covid1 * study4) + I(covid2 * covid3) +
## I(covid2 * covid4) + I(covid2 * study4) + I(covid3 * covid4) +
## I(covid3 * study2) + I(covid3 * study3) + I(covid4 * study2) +
## I(covid4 * study3) + I(study1 * study3) + I(study1 * study4) +
## I(study2 * study3)
##
## Df Sum of Sq RSS AIC
## - I(quiz1^2) 1 0.01854 2.2174 -475.81
## <none> 2.1989 -475.01
## - I(study1 * study3) 1 0.03200 2.2309 -474.94
## + quiz1 1 0.02849 2.1704 -474.87
## + I(covid2 * study2) 1 0.02048 2.1784 -474.35
## + I(quiz1 * study2) 1 0.02033 2.1786 -474.34
## + I(covid4 * study4) 1 0.01527 2.1836 -474.00
## + study3 1 0.01327 2.1856 -473.87
## + I(covid3 * study4) 1 0.01162 2.1873 -473.77
## - I(study2^2) 1 0.05067 2.2496 -473.75

```

```

## + I(covid2 * study3) 1 0.01050 2.1884 -473.69
## + I(study1 * study2) 1 0.00934 2.1896 -473.62
## + I(quiz2 * covid4) 1 0.00892 2.1900 -473.59
## + I(quiz3 * covid2) 1 0.00850 2.1904 -473.56
## + study2 1 0.00795 2.1910 -473.53
## - I(covid2 * covid4) 1 0.05479 2.2537 -473.49
## + I(covid2 * study1) 1 0.00642 2.1925 -473.43
## + I(study3^2) 1 0.00546 2.1934 -473.36
## + I(study3 * study4) 1 0.00522 2.1937 -473.35
## + I(covid3 * study1) 1 0.00437 2.1945 -473.29
## + I(quiz2 * study1) 1 0.00417 2.1947 -473.28
## + I(covid1 * study2) 1 0.00308 2.1958 -473.21
## + I(covid2^2) 1 0.00282 2.1961 -473.19
## + I(quiz1 * study3) 1 0.00269 2.1962 -473.18
## + I(study2 * study4) 1 0.00263 2.1963 -473.18
## + I(quiz4 * covid4) 1 0.00179 2.1971 -473.12
## + I(quiz3 * covid1) 1 0.00121 2.1977 -473.09
## + I(quiz3 * study4) 1 0.00080 2.1981 -473.06
## + I(quiz3 * study2) 1 0.00038 2.1985 -473.03
## + I(quiz2 * covid3) 1 0.00034 2.1986 -473.03
## + I(quiz2 * covid1) 1 0.00030 2.1986 -473.03
## + I(quiz4 * study4) 1 0.00015 2.1988 -473.02
## + I(covid4 * study1) 1 0.00000 2.1989 -473.01
## - I(quiz3 * covid3) 1 0.06788 2.2668 -472.66
## - I(quiz2^2) 1 0.07180 2.2707 -472.41
## - I(quiz2 * study4) 1 0.07290 2.2718 -472.34
## - I(covid4 * study2) 1 0.07461 2.2735 -472.24
## - I(quiz1 * study4) 1 0.07679 2.2757 -472.10
## - I(covid3 * study2) 1 0.08094 2.2798 -471.84
## - I(quiz1 * covid4) 1 0.08808 2.2870 -471.39
## - I(quiz2 * covid2) 1 0.09718 2.2961 -470.82
## - I(covid3^2) 1 0.09730 2.2962 -470.82
## - I(quiz2 * study2) 1 0.09738 2.2963 -470.81
## - I(quiz4 * covid1) 1 0.09990 2.2988 -470.66
## - I(quiz2 * study3) 1 0.10270 2.3016 -470.48
## - I(study1^2) 1 0.10826 2.3072 -470.14
## - I(covid1 * study3) 1 0.11091 2.3098 -469.97
## - I(quiz3^2) 1 0.11892 2.3178 -469.48
## - I(covid1 * study4) 1 0.12037 2.3193 -469.39
## - quiz2 1 0.13908 2.3380 -468.24
## - I(covid4 * study3) 1 0.13925 2.3382 -468.23
## - I(covid1 * covid3) 1 0.14327 2.3422 -467.98
## - I(study4^2) 1 0.15415 2.3531 -467.32
## - I(quiz4 * study2) 1 0.15581 2.3547 -467.22
## - I(covid1 * covid2) 1 0.16390 2.3628 -466.73
## - I(covid3 * covid4) 1 0.17516 2.3741 -466.05
## - I(study1 * study4) 1 0.18950 2.3884 -465.19
## - I(covid1 * study1) 1 0.19339 2.3923 -464.95
## - study1 1 0.20082 2.3997 -464.51
## - I(study2 * study3) 1 0.20210 2.4010 -464.43
## - I(quiz3 * covid4) 1 0.21715 2.4161 -463.54
## - I(quiz3 * study1) 1 0.23223 2.4311 -462.65
## - I(quiz1 * covid1) 1 0.23611 2.4350 -462.42
## - I(quiz1 * quiz2) 1 0.27640 2.4753 -460.08

```

```

## - I(quiz1 * study1) 1 0.28300 2.4819 -459.70
## - I(quiz1 * covid3) 1 0.28353 2.4824 -459.67
## - I(covid4^2) 1 0.30245 2.5014 -458.58
## - I(covid1 * covid4) 1 0.32921 2.5281 -457.06
## - covid4 1 0.34149 2.5404 -456.37
## - study4 1 0.34801 2.5469 -456.00
## - covid1 1 0.37990 2.5788 -454.22
## - I(quiz4 * covid2) 1 0.37993 2.5788 -454.22
## - I(covid1^2) 1 0.38014 2.5790 -454.21
## - I(quiz1 * covid2) 1 0.42697 2.6259 -451.63
## - quiz3 1 0.47414 2.6730 -449.09
## - I(quiz4 * covid3) 1 0.50807 2.7070 -447.28
## - I(covid2 * study4) 1 0.53327 2.7322 -445.96
## - I(quiz2 * quiz3) 1 0.54811 2.7470 -445.18
## - I(covid2 * covid3) 1 0.59642 2.7953 -442.69
## - I(quiz3 * quiz4) 1 0.60269 2.8016 -442.37
## - covid3 1 0.64828 2.8472 -440.06
## - I(quiz4 * study1) 1 0.73687 2.9358 -435.68
## - I(quiz2 * quiz4) 1 0.77581 2.9747 -433.80
## - covid2 1 0.78934 2.9882 -433.15
## - I(quiz4 * study3) 1 0.81560 3.0145 -431.90
## - I(quiz3 * study3) 1 0.99595 3.1949 -423.59
## - I(covid3 * study3) 1 1.05592 3.2548 -420.93
## - I(quiz1 * quiz3) 1 1.53003 3.7289 -401.48
## - I(quiz1 * quiz4) 1 2.57907 4.7780 -366.03
##
## Step: AIC=-475.81
## quiz4 ~ quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 + study1 +
## study4 + I(quiz2^2) + I(quiz3^2) + I(covid1^2) + I(covid3^2) +
## I(covid4^2) + I(study1^2) + I(study2^2) + I(study4^2) + I(quiz1 *
## quiz2) + I(quiz1 * quiz3) + I(quiz1 * quiz4) + I(quiz1 *
## covid1) + I(quiz1 * covid2) + I(quiz1 * covid3) + I(quiz1 *
## covid4) + I(quiz1 * study1) + I(quiz1 * study4) + I(quiz2 *
## quiz3) + I(quiz2 * quiz4) + I(quiz2 * covid2) + I(quiz2 *
## study2) + I(quiz2 * study3) + I(quiz2 * study4) + I(quiz3 *
## quiz4) + I(quiz3 * covid3) + I(quiz3 * covid4) + I(quiz3 *
## study1) + I(quiz3 * study3) + I(quiz4 * covid1) + I(quiz4 *
## covid2) + I(quiz4 * covid3) + I(quiz4 * study1) + I(quiz4 *
## study2) + I(quiz4 * study3) + I(covid1 * covid2) + I(covid1 *
## covid3) + I(covid1 * covid4) + I(covid1 * study1) + I(covid1 *
## study3) + I(covid1 * study4) + I(covid2 * covid3) + I(covid2 *
## covid4) + I(covid2 * study4) + I(covid3 * covid4) + I(covid3 *
## study2) + I(covid3 * study3) + I(covid4 * study2) + I(covid4 *
## study3) + I(study1 * study3) + I(study1 * study4) + I(study2 *
## study3)
##
## Df Sum of Sq RSS AIC
## - I(study1 * study3) 1 0.02623 2.2437 -476.13
## <none> 2.2174 -475.81
## + I(covid2 * study2) 1 0.01926 2.1982 -475.06
## + I(quiz1 * study2) 1 0.01866 2.1988 -475.02
## + I(quiz1^2) 1 0.01854 2.1989 -475.01
## + study3 1 0.01641 2.2010 -474.87
## - I(study2^2) 1 0.04879 2.2662 -474.70

```

```

## + I(covid3 * study4) 1 0.01277 2.2047 -474.63
## + I(quiz3 * covid2) 1 0.01046 2.2070 -474.48
## + I(covid2 * study3) 1 0.00967 2.2078 -474.43
## + I(covid4 * study4) 1 0.00962 2.2078 -474.43
## + I(quiz2 * covid4) 1 0.00938 2.2081 -474.41
## + study2 1 0.00923 2.2082 -474.40
## + quiz1 1 0.00843 2.2090 -474.35
## + I(study1 * study2) 1 0.00694 2.2105 -474.26
## + I(covid3 * study1) 1 0.00574 2.2117 -474.18
## + I(quiz1 * study3) 1 0.00494 2.2125 -474.13
## + I(study2 * study4) 1 0.00489 2.2126 -474.12
## + I(covid2 * study1) 1 0.00413 2.2133 -474.07
## + I(covid1 * study2) 1 0.00362 2.2138 -474.04
## + I(covid2^2) 1 0.00352 2.2139 -474.04
## + I(study3 * study4) 1 0.00294 2.2145 -474.00
## + I(quiz2 * study1) 1 0.00280 2.2147 -473.99
## + I(study3^2) 1 0.00236 2.2151 -473.96
## + I(quiz3 * covid1) 1 0.00194 2.2155 -473.93
## + I(quiz3 * study4) 1 0.00191 2.2155 -473.93
## + I(quiz2 * covid3) 1 0.00098 2.2165 -473.87
## + I(quiz4 * study4) 1 0.00076 2.2167 -473.86
## + I(quiz4 * covid4) 1 0.00073 2.2167 -473.85
## + I(quiz2 * covid1) 1 0.00027 2.2172 -473.83
## + I(covid4 * study1) 1 0.00007 2.2174 -473.81
## + I(quiz3 * study2) 1 0.00001 2.2174 -473.81
## - I(quiz3 * covid3) 1 0.06970 2.2872 -473.38
## - I(covid2 * covid4) 1 0.07143 2.2889 -473.27
## - I(covid4 * study2) 1 0.07777 2.2952 -472.88
## - I(quiz1 * study4) 1 0.07803 2.2955 -472.86
## - I(quiz2 * study4) 1 0.07924 2.2967 -472.79
## - I(quiz2^2) 1 0.08935 2.3068 -472.16
## - I(study1^2) 1 0.09109 2.3085 -472.05
## - I(covid3^2) 1 0.09140 2.3089 -472.03
## - I(covid3 * study2) 1 0.09201 2.3095 -471.99
## - I(quiz4 * covid1) 1 0.10003 2.3175 -471.50
## - I(quiz3^2) 1 0.10039 2.3178 -471.48
## - I(quiz1 * covid4) 1 0.10532 2.3228 -471.17
## - I(quiz2 * covid2) 1 0.10858 2.3260 -470.97
## - I(quiz2 * study2) 1 0.12063 2.3381 -470.23
## - I(quiz2 * study3) 1 0.12118 2.3386 -470.20
## - I(covid1 * study4) 1 0.12280 2.3402 -470.10
## - I(covid4 * study3) 1 0.12857 2.3460 -469.75
## - I(covid1 * study3) 1 0.13012 2.3476 -469.65
## - quiz2 1 0.13509 2.3525 -469.35
## - I(covid1 * covid2) 1 0.14911 2.3666 -468.50
## - I(study4^2) 1 0.15450 2.3719 -468.18
## - I(covid1 * covid3) 1 0.15899 2.3764 -467.91
## - I(covid3 * covid4) 1 0.16077 2.3782 -467.80
## - I(quiz4 * study2) 1 0.16296 2.3804 -467.67
## - I(study1 * study4) 1 0.17520 2.3926 -466.93
## - I(covid1 * study1) 1 0.18494 2.4024 -466.35
## - study1 1 0.18516 2.4026 -466.34
## - I(study2 * study3) 1 0.18533 2.4028 -466.33
## - I(quiz3 * covid4) 1 0.20997 2.4274 -464.87

```

```

## - I(quiz3 * study1) 1 0.21763 2.4351 -464.42
## - I(quiz1 * study1) 1 0.26482 2.4823 -461.67
## - I(quiz1 * covid3) 1 0.27973 2.4972 -460.82
## - I(quiz1 * covid1) 1 0.28539 2.5028 -460.49
## - I(quiz1 * quiz2) 1 0.29417 2.5116 -459.99
## - I(covid4^2) 1 0.30785 2.5253 -459.22
## - I(covid1 * covid4) 1 0.33204 2.5495 -457.85
## - covid4 1 0.34731 2.5648 -457.00
## - study4 1 0.34786 2.5653 -456.97
## - I(covid1^2) 1 0.36488 2.5823 -456.02
## - I(quiz4 * covid2) 1 0.37289 2.5903 -455.58
## - I(quiz1 * covid2) 1 0.42031 2.6378 -452.99
## - covid1 1 0.46515 2.6826 -450.58
## - I(quiz4 * covid3) 1 0.50671 2.7242 -448.38
## - I(covid2 * study4) 1 0.52778 2.7452 -447.28
## - quiz3 1 0.56338 2.7808 -445.43
## - I(quiz3 * quiz4) 1 0.58906 2.8065 -444.12
## - I(covid2 * covid3) 1 0.59468 2.8121 -443.83
## - I(quiz2 * quiz3) 1 0.62762 2.8451 -442.17
## - covid3 1 0.64147 2.8589 -441.47
## - I(quiz4 * study1) 1 0.71881 2.9363 -437.66
## - I(quiz2 * quiz4) 1 0.77467 2.9921 -434.96
## - covid2 1 0.78886 3.0063 -434.28
## - I(quiz4 * study3) 1 0.79784 3.0153 -433.86
## - I(quiz3 * study3) 1 0.98741 3.2049 -425.14
## - I(covid3 * study3) 1 1.11895 3.3364 -419.39
## - I(quiz1 * quiz3) 1 1.91957 4.1370 -388.63
## - I(quiz1 * quiz4) 1 2.63298 4.8504 -365.88
##
## Step: AIC=-476.13
## quiz4 ~ quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 + study1 +
## study4 + I(quiz2^2) + I(quiz3^2) + I(covid1^2) + I(covid3^2) +
## I(covid4^2) + I(study1^2) + I(study2^2) + I(study4^2) + I(quiz1 *
## quiz2) + I(quiz1 * quiz3) + I(quiz1 * quiz4) + I(quiz1 *
## covid1) + I(quiz1 * covid2) + I(quiz1 * covid3) + I(quiz1 *
## covid4) + I(quiz1 * study1) + I(quiz1 * study4) + I(quiz2 *
## quiz3) + I(quiz2 * quiz4) + I(quiz2 * covid2) + I(quiz2 *
## study2) + I(quiz2 * study3) + I(quiz2 * study4) + I(quiz3 *
## quiz4) + I(quiz3 * covid3) + I(quiz3 * covid4) + I(quiz3 *
## study1) + I(quiz3 * study3) + I(quiz4 * covid1) + I(quiz4 *
## covid2) + I(quiz4 * covid3) + I(quiz4 * study1) + I(quiz4 *
## study2) + I(quiz4 * study3) + I(covid1 * covid2) + I(covid1 *
## covid3) + I(covid1 * covid4) + I(covid1 * study1) + I(covid1 *
## study3) + I(covid1 * study4) + I(covid2 * covid3) + I(covid2 *
## covid4) + I(covid2 * study4) + I(covid3 * covid4) + I(covid3 *
## study2) + I(covid3 * study3) + I(covid4 * study2) + I(covid4 *
## study3) + I(study1 * study4) + I(study2 * study3)
##
## Df Sum of Sq RSS AIC
## <none> 2.2437 -476.13
## + I(study1 * study3) 1 0.02623 2.2174 -475.81
## + I(quiz1 * study2) 1 0.02423 2.2194 -475.68
## - I(study2^2) 1 0.03885 2.2825 -475.67
## + study3 1 0.01972 2.2240 -475.39

```

```

## + I(covid2 * study2) 1 0.01809 2.2256 -475.28
## + I(quiz2 * covid4) 1 0.01308 2.2306 -474.96
## + I(quiz1^2) 1 0.01277 2.2309 -474.94
## + I(study3^2) 1 0.01080 2.2329 -474.82
## + I(covid3 * study4) 1 0.00981 2.2339 -474.75
## + I(covid2 * study3) 1 0.00927 2.2344 -474.72
## + quiz1 1 0.00874 2.2349 -474.68
## + study2 1 0.00793 2.2357 -474.63
## + I(study1 * study2) 1 0.00656 2.2371 -474.54
## + I(quiz1 * study3) 1 0.00634 2.2373 -474.53
## + I(covid2^2) 1 0.00503 2.2387 -474.45
## + I(quiz2 * study1) 1 0.00499 2.2387 -474.44
## + I(quiz3 * study4) 1 0.00499 2.2387 -474.44
## - I(quiz1 * study4) 1 0.05871 2.3024 -474.43
## + I(quiz3 * covid2) 1 0.00454 2.2391 -474.42
## + I(quiz4 * study4) 1 0.00369 2.2400 -474.36
## + I(covid1 * study2) 1 0.00259 2.2411 -474.29
## + I(study3 * study4) 1 0.00209 2.2416 -474.26
## + I(covid3 * study1) 1 0.00206 2.2416 -474.26
## + I(covid4 * study4) 1 0.00206 2.2416 -474.26
## + I(study2 * study4) 1 0.00125 2.2424 -474.21
## + I(covid2 * study1) 1 0.00122 2.2425 -474.20
## + I(covid4 * study1) 1 0.00112 2.2426 -474.20
## + I(quiz4 * covid4) 1 0.00070 2.2430 -474.17
## + I(quiz3 * covid1) 1 0.00027 2.2434 -474.14
## + I(quiz2 * covid1) 1 0.00005 2.2436 -474.13
## + I(quiz2 * covid3) 1 0.00004 2.2436 -474.13
## + I(quiz3 * study2) 1 0.00003 2.2436 -474.13
## - I(study1^2) 1 0.06487 2.3085 -474.05
## - I(covid4 * study2) 1 0.07393 2.3176 -473.49
## - I(quiz2^2) 1 0.07716 2.3208 -473.29
## - I(covid3^2) 1 0.08281 2.3265 -472.94
## - I(quiz3 * covid3) 1 0.08281 2.3265 -472.94
## - I(covid3 * study2) 1 0.08823 2.3319 -472.61
## - I(covid2 * covid4) 1 0.08997 2.3336 -472.50
## - I(quiz1 * covid4) 1 0.09135 2.3350 -472.42
## - I(quiz4 * covid1) 1 0.09319 2.3369 -472.31
## - I(covid1 * study4) 1 0.10195 2.3456 -471.77
## - I(quiz3^2) 1 0.10640 2.3501 -471.50
## - quiz2 1 0.11605 2.3597 -470.91
## - I(covid4 * study3) 1 0.11705 2.3607 -470.85
## - I(quiz2 * study3) 1 0.11889 2.3626 -470.74
## - I(covid1 * study3) 1 0.11902 2.3627 -470.73
## - I(quiz2 * study4) 1 0.12238 2.3661 -470.53
## - I(quiz2 * study2) 1 0.12487 2.3685 -470.38
## - I(quiz2 * covid2) 1 0.12650 2.3702 -470.28
## - I(covid1 * covid2) 1 0.13030 2.3740 -470.05
## - I(quiz4 * study2) 1 0.13837 2.3820 -469.57
## - I(covid3 * covid4) 1 0.14436 2.3880 -469.21
## - I(covid1 * covid3) 1 0.14969 2.3934 -468.89
## - I(covid1 * study1) 1 0.16634 2.4100 -467.90
## - I(study2 * study3) 1 0.18468 2.4284 -466.82
## - I(study4^2) 1 0.18600 2.4297 -466.74
## - I(quiz3 * study1) 1 0.19180 2.4355 -466.40

```



```

## - study1          1    0.21861 2.4623 -464.83
## - I(quiz1 * study1) 1    0.24222 2.4859 -463.47
## - I(quiz3 * covid4) 1    0.24839 2.4921 -463.11
## - I(quiz1 * quiz2)  1    0.28654 2.5302 -460.94
## - I(quiz1 * covid1) 1    0.30106 2.5447 -460.12
## - I(covid4^2)       1    0.31048 2.5542 -459.59
## - I(covid1 * covid4) 1    0.31275 2.5564 -459.47
## - I(quiz1 * covid3) 1    0.31789 2.5616 -459.18
## - I(covid1^2)       1    0.33885 2.5825 -458.01
## - covid4           1    0.35334 2.5970 -457.21
## - I(quiz4 * covid2) 1    0.37407 2.6177 -456.08
## - I(study1 * study4) 1    0.40527 2.6489 -454.38
## - I(quiz1 * covid2) 1    0.40953 2.6532 -454.15
## - study4           1    0.42523 2.6689 -453.31
## - covid1           1    0.47750 2.7212 -450.53
## - I(quiz4 * covid3) 1    0.49434 2.7380 -449.65
## - I(covid2 * study4) 1    0.50176 2.7454 -449.27
## - quiz3            1    0.55548 2.7992 -446.49
## - I(covid2 * covid3) 1    0.57914 2.8228 -445.29
## - I(quiz3 * quiz4)  1    0.58112 2.8248 -445.19
## - I(quiz2 * quiz3)  1    0.62133 2.8650 -443.17
## - covid3           1    0.62958 2.8733 -442.76
## - I(quiz4 * study1) 1    0.69388 2.9376 -439.59
## - I(quiz2 * quiz4)  1    0.79533 3.0390 -434.74
## - covid2           1    0.80475 3.0484 -434.30
## - I(quiz4 * study3) 1    0.81695 3.0606 -433.72
## - I(quiz3 * study3) 1    1.01311 3.2568 -424.84
## - I(covid3 * study3) 1    1.09827 3.3419 -421.15
## - I(quiz1 * quiz3)  1    2.01856 4.2622 -386.37
## - I(quiz1 * quiz4)  1    2.73276 4.9764 -364.21

```

```
step8$anova
```

```

## Stepwise Model Path
## Analysis of Deviance Table
##
## Initial Model:
## quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 +
##   study1 + study2 + study3 + study4 + I(quiz1^2) + I(quiz2^2) +
##   I(quiz3^2) + I(covid1^2) + I(covid2^2) + I(covid3^2) + I(covid4^2) +
##   I(study1^2) + I(study2^2) + I(study3^2) + I(study4^2) + I(quiz1 *
##   quiz2) + I(quiz1 * quiz3) + I(quiz1 * quiz4) + I(quiz1 *
##   covid1) + I(quiz1 * covid2) + I(quiz1 * covid3) + I(quiz1 *
##   covid4) + I(quiz1 * study1) + I(quiz1 * study2) + I(quiz1 *
##   study3) + I(quiz1 * study4) + I(quiz2 * quiz3) + I(quiz2 *
##   quiz4) + I(quiz2 * covid1) + I(quiz2 * covid2) + I(quiz2 *
##   covid3) + I(quiz2 * covid4) + I(quiz2 * study1) + I(quiz2 *
##   study2) + I(quiz2 * study3) + I(quiz2 * study4) + I(quiz3 *
##   quiz4) + I(quiz3 * covid1) + I(quiz3 * covid2) + I(quiz3 *
##   covid3) + I(quiz3 * covid4) + I(quiz3 * study1) + I(quiz3 *
##   study2) + I(quiz3 * study3) + I(quiz3 * study4) + I(quiz4 *
##   covid1) + I(quiz4 * covid2) + I(quiz4 * covid3) + I(quiz4 *
##   covid4) + I(quiz4 * study1) + I(quiz4 * study2) + I(quiz4 *
##   study3) + I(quiz4 * study4) + I(covid1 * covid2) + I(covid1 *

```

```

## covid3) + I(covid1 * covid4) + I(covid1 * study1) + I(covid1 *
## study2) + I(covid1 * study3) + I(covid1 * study4) + I(covid2 *
## covid3) + I(covid2 * covid4) + I(covid2 * study1) + I(covid2 *
## study2) + I(covid2 * study3) + I(covid2 * study4) + I(covid3 *
## covid4) + I(covid3 * study1) + I(covid3 * study2) + I(covid3 *
## study3) + I(covid3 * study4) + I(covid4 * study1) + I(covid4 *
## study2) + I(covid4 * study3) + I(covid4 * study4) + I(study1 *
## study2) + I(study1 * study3) + I(study1 * study4) + I(study2 *
## study3) + I(study2 * study4) + I(study3 * study4)
##
## Final Model:
## quiz4 ~ quiz2 + quiz3 + covid1 + covid2 + covid3 + covid4 + study1 +
## study4 + I(quiz2^2) + I(quiz3^2) + I(covid1^2) + I(covid3^2) +
## I(covid4^2) + I(study1^2) + I(study2^2) + I(study4^2) + I(quiz1 *
## quiz2) + I(quiz1 * quiz3) + I(quiz1 * quiz4) + I(quiz1 *
## covid1) + I(quiz1 * covid2) + I(quiz1 * covid3) + I(quiz1 *
## covid4) + I(quiz1 * study1) + I(quiz1 * study4) + I(quiz2 *
## quiz3) + I(quiz2 * quiz4) + I(quiz2 * covid2) + I(quiz2 *
## study2) + I(quiz2 * study3) + I(quiz2 * study4) + I(quiz3 *
## quiz4) + I(quiz3 * covid3) + I(quiz3 * covid4) + I(quiz3 *
## study1) + I(quiz3 * study3) + I(quiz4 * covid1) + I(quiz4 *
## covid2) + I(quiz4 * covid3) + I(quiz4 * study1) + I(quiz4 *
## study2) + I(quiz4 * study3) + I(covid1 * covid2) + I(covid1 *
## covid3) + I(covid1 * covid4) + I(covid1 * study1) + I(covid1 *
## study3) + I(covid1 * study4) + I(covid2 * covid3) + I(covid2 *
## covid4) + I(covid2 * study4) + I(covid3 * covid4) + I(covid3 *
## study2) + I(covid3 * study3) + I(covid4 * study2) + I(covid4 *
## study3) + I(study1 * study4) + I(study2 * study3)
##
##
##
## Step Df      Deviance Resid. Df Resid. Dev      AIC
## 1
## 2 - I(study3 * study4) 1 4.902245e-06      55 1.993620 -435.0236
## 3 - I(quiz1 * study3) 1 2.109996e-05      56 1.993641 -437.0221
## 4 - I(quiz2 * study1) 1 3.431710e-05      57 1.993676 -439.0196
## 5 - I(quiz4 * study4) 1 2.846587e-04      58 1.993960 -440.9992
## 6 - study2 1 3.633002e-04      59 1.994324 -442.9732
## 7 - I(quiz1 * study2) 1 4.766837e-04      60 1.994800 -444.9390
## 8 - I(covid2 * study1) 1 1.222449e-03      61 1.996023 -446.8514
## 9 - I(covid4 * study4) 1 8.315479e-04      62 1.996854 -448.7918
## 10 - I(quiz2 * covid3) 1 1.119944e-03      63 1.997974 -450.7117
## 11 - I(quiz3 * study2) 1 1.750337e-03      64 1.999725 -452.5864
## 12 - I(covid2 * study2) 1 1.834959e-03      65 2.001560 -454.4553
## 13 - I(study3^2) 1 3.118476e-03      66 2.004678 -456.2327
## 14 - I(quiz2 * covid1) 1 3.748577e-03      67 2.008427 -457.9655
## 15 - I(quiz4 * covid4) 1 4.450462e-03      68 2.012877 -459.6490
## 16 - I(quiz3 * study4) 1 5.535870e-03      69 2.018413 -461.2562
## 17 - I(covid1 * study2) 1 5.913835e-03      70 2.024327 -462.8379
## 18 - I(study2 * study4) 1 5.878918e-03      71 2.030206 -464.4232
## 19 - I(covid2^2) 1 1.040344e-02      72 2.040609 -465.6923
## 20 - I(covid3 * study4) 1 7.184507e-03      73 2.047794 -467.1897
## 21 - I(covid3 * study1) 1 5.862422e-03      74 2.053656 -468.7809
## 22 - I(covid4 * study1) 1 3.605768e-03      75 2.057262 -470.5300
## 23 - I(quiz2 * covid4) 1 1.940667e-02      76 2.076668 -471.1874

```

## 24	- I(quiz3 * covid2)	1	1.656194e-02	77	2.093230	-472.0515
## 25	- I(quiz3 * covid1)	1	8.383509e-03	78	2.101614	-473.4799
## 26	- I(covid2 * study3)	1	1.882250e-02	79	2.120436	-474.2048
## 27	- I(study1 * study2)	1	2.985690e-02	80	2.150293	-474.2054
## 28	- study3	1	2.012501e-02	81	2.170418	-474.8732
## 29	- quiz1	1	2.848850e-02	82	2.198907	-475.0085
## 30	- I(quiz1^2)	1	1.854235e-02	83	2.217449	-475.8077
## 31	- I(study1 * study3)	1	2.622712e-02	84	2.243676	-476.1262

Find Significance Predictor Variables

```
# use week 5b slides -- choose model selection criterion to pick predictor variables.
```

```
# use lm() on a bunch of predictor variables to determine significant  
# predictor variables.
```

```
summary(full_model.fit2)
```

```
##  
## Call:  
## lm(formula = quiz4 ~ quiz1 + quiz2 + quiz3 + covid1 + covid2 +  
##      covid3 + covid4 + study1 + study2 + study3 + study4 + I(quiz1^2) +  
##      I(quiz2^2) + I(quiz3^2) + I(covid1^2) + I(covid2^2) + I(covid3^2) +  
##      I(covid4^2) + I(study1^2) + I(study2^2) + I(study3^2) + I(study4^2) +  
##      I(quiz1 * quiz2) + I(quiz1 * quiz3) + I(quiz1 * quiz4) +  
##      I(quiz1 * covid1) + I(quiz1 * covid2) + I(quiz1 * covid3) +  
##      I(quiz1 * covid4) + I(quiz1 * study1) + I(quiz1 * study2) +  
##      I(quiz1 * study3) + I(quiz1 * study4) + I(quiz2 * quiz3) +  
##      I(quiz2 * quiz4) + I(quiz2 * covid1) + I(quiz2 * covid2) +  
##      I(quiz2 * covid3) + I(quiz2 * covid4) + I(quiz2 * study1) +  
##      I(quiz2 * study2) + I(quiz2 * study3) + I(quiz2 * study4) +  
##      I(quiz3 * quiz4) + I(quiz3 * covid1) + I(quiz3 * covid2) +  
##      I(quiz3 * covid3) + I(quiz3 * covid4) + I(quiz3 * study1) +  
##      I(quiz3 * study2) + I(quiz3 * study3) + I(quiz3 * study4) +  
##      I(quiz4 * covid1) + I(quiz4 * covid2) + I(quiz4 * covid3) +  
##      I(quiz4 * covid4) + I(quiz4 * study1) + I(quiz4 * study2) +  
##      I(quiz4 * study3) + I(quiz4 * study4) + I(covid1 * covid2) +  
##      I(covid1 * covid3) + I(covid1 * covid4) + I(covid1 * study1) +  
##      I(covid1 * study2) + I(covid1 * study3) + I(covid1 * study4) +  
##      I(covid2 * covid3) + I(covid2 * covid4) + I(covid2 * study1) +  
##      I(covid2 * study2) + I(covid2 * study3) + I(covid2 * study4) +  
##      I(covid3 * covid4) + I(covid3 * study1) + I(covid3 * study2) +  
##      I(covid3 * study3) + I(covid3 * study4) + I(covid4 * study1) +  
##      I(covid4 * study2) + I(covid4 * study3) + I(covid4 * study4) +  
##      I(study1 * study2) + I(study1 * study3) + I(study1 * study4) +  
##      I(study2 * study3) + I(study2 * study4) + I(study3 * study4))  
##  
## Residuals:  
##      Min      1Q   Median      3Q      Max   
## -0.36604 -0.05447 -0.00005  0.06790  0.37832   
##  
## Coefficients:  
##              Estimate Std. Error t value Pr(>|t|)      
## (Intercept)    3.314e+00  6.329e-01   5.237 2.76e-06 ***  
## quiz1          -9.848e-02  1.124e-01  -0.876  0.38498      
## quiz2           9.036e-02  9.201e-02   0.982  0.33047      
## quiz3           2.953e-01  1.108e-01   2.665  0.01013 *      
## covid1          -4.482e-01  1.891e-01  -2.370  0.02138 *      
## covid2           9.096e-01  3.134e-01   2.902  0.00536 **     
## covid3          -6.073e-01  2.499e-01  -2.431  0.01843 *      
## covid4          -4.286e-01  1.594e-01  -2.689  0.00951 **   
```

```

## study1      1.603e-01  9.071e-02  1.768  0.08279 .
## study2      1.010e-02  1.140e-01  0.089  0.92967
## study3     -8.448e-02  7.375e-02 -1.145  0.25711
## study4     -7.008e-02  5.053e-02 -1.387  0.17119
## I(quiz1^2)   6.798e-03  6.653e-03  1.022  0.31144
## I(quiz2^2)  -4.838e-03  5.362e-03 -0.902  0.37092
## I(quiz3^2)   9.455e-03  7.472e-03  1.265  0.21119
## I(covid1^2) -5.319e-03  4.612e-03 -1.153  0.25388
## I(covid2^2) -3.108e-03  1.216e-02 -0.256  0.79923
## I(covid3^2)  7.780e-03  7.822e-03  0.995  0.32437
## I(covid4^2) -1.316e-02  7.048e-03 -1.867  0.06735 .
## I(study1^2) -1.767e-03  1.956e-03 -0.904  0.37023
## I(study2^2)  3.070e-03  2.955e-03  1.039  0.30350
## I(study3^2)  6.474e-04  3.219e-03  0.201  0.84138
## I(study4^2)  4.272e-04  3.611e-04  1.183  0.24202
## I(quiz1 * quiz2) -1.613e-02  7.787e-03 -2.071  0.04314 *
## I(quiz1 * quiz3) -4.141e-02  8.287e-03 -4.997  6.47e-06 ***
## I(quiz1 * quiz4)  5.162e-02  8.274e-03  6.239  7.04e-08 ***
## I(quiz1 * covid1)  3.967e-02  1.846e-02  2.149  0.03615 *
## I(quiz1 * covid2) -5.328e-02  2.245e-02 -2.373  0.02122 *
## I(quiz1 * covid3)  4.875e-02  2.269e-02  2.148  0.03618 *
## I(quiz1 * covid4)  2.541e-02  1.733e-02  1.467  0.14829
## I(quiz1 * study1) -9.387e-03  7.020e-03 -1.337  0.18679
## I(quiz1 * study2) -1.019e-03  1.157e-02 -0.088  0.93017
## I(quiz1 * study3) -2.043e-04  7.857e-03 -0.026  0.97935
## I(quiz1 * study4)  1.621e-03  4.109e-03  0.394  0.69485
## I(quiz2 * quiz3) -2.009e-02  7.827e-03 -2.567  0.01306 *
## I(quiz2 * quiz4)  3.082e-02  9.223e-03  3.342  0.00152 **
## I(quiz2 * covid1)  8.030e-03  1.789e-02  0.449  0.65530
## I(quiz2 * covid2) -2.670e-02  2.217e-02 -1.204  0.23381
## I(quiz2 * covid3) -3.213e-03  1.721e-02 -0.187  0.85262
## I(quiz2 * covid4)  8.575e-03  1.288e-02  0.666  0.50851
## I(quiz2 * study1) -1.625e-04  5.560e-03 -0.029  0.97679
## I(quiz2 * study2) -7.167e-03  7.683e-03 -0.933  0.35510
## I(quiz2 * study3)  5.880e-03  5.127e-03  1.147  0.25650
## I(quiz2 * study4)  3.469e-03  2.628e-03  1.320  0.19241
## I(quiz3 * quiz4)  2.245e-02  9.199e-03  2.440  0.01798 *
## I(quiz3 * covid1) -1.566e-02  2.634e-02 -0.594  0.55470
## I(quiz3 * covid2)  1.437e-02  2.627e-02  0.547  0.58656
## I(quiz3 * covid3) -1.659e-02  1.976e-02 -0.840  0.40470
## I(quiz3 * covid4)  1.531e-02  2.070e-02  0.740  0.46278
## I(quiz3 * study1)  7.230e-03  6.967e-03  1.038  0.30396
## I(quiz3 * study2)  2.128e-03  1.048e-02  0.203  0.83988
## I(quiz3 * study3) -1.473e-02  8.792e-03 -1.676  0.09960 .
## I(quiz3 * study4) -8.848e-04  3.878e-03 -0.228  0.82039
## I(quiz4 * covid1)  2.921e-02  2.234e-02  1.308  0.19647
## I(quiz4 * covid2) -6.646e-02  2.527e-02 -2.630  0.01111 *
## I(quiz4 * covid3)  5.382e-02  2.276e-02  2.365  0.02165 *
## I(quiz4 * covid4)  5.731e-03  2.088e-02  0.274  0.78479
## I(quiz4 * study1) -1.626e-02  5.873e-03 -2.768  0.00771 **
## I(quiz4 * study2)  5.979e-03  1.201e-02  0.498  0.62076
## I(quiz4 * study3)  2.124e-02  7.068e-03  3.005  0.00403 **
## I(quiz4 * study4)  2.763e-04  3.362e-03  0.082  0.93480
## I(covid1 * covid2) 2.084e-02  2.273e-02  0.916  0.36349

```

```

## I(covid1 * covid3) 3.500e-02 4.187e-02 0.836 0.40679
## I(covid1 * covid4) -3.813e-02 2.268e-02 -1.681 0.09851 .
## I(covid1 * study1) -7.927e-03 1.052e-02 -0.753 0.45459
## I(covid1 * study2) 5.193e-03 1.602e-02 0.324 0.74705
## I(covid1 * study3) 4.260e-03 1.546e-02 0.276 0.78395
## I(covid1 * study4) -5.542e-03 9.396e-03 -0.590 0.55776
## I(covid2 * covid3) -5.255e-02 2.653e-02 -1.981 0.05270 .
## I(covid2 * covid4) 2.000e-02 1.610e-02 1.242 0.21959
## I(covid2 * study1) -1.708e-03 1.317e-02 -0.130 0.89735
## I(covid2 * study2) 4.442e-03 1.823e-02 0.244 0.80843
## I(covid2 * study3) 9.553e-03 1.441e-02 0.663 0.51012
## I(covid2 * study4) 6.808e-03 7.395e-03 0.921 0.36136
## I(covid3 * covid4) 3.092e-02 2.117e-02 1.460 0.15006
## I(covid3 * study1) -8.587e-03 1.662e-02 -0.517 0.60756
## I(covid3 * study2) 1.637e-02 1.514e-02 1.081 0.28449
## I(covid3 * study3) -2.133e-02 8.491e-03 -2.512 0.01503 *
## I(covid3 * study4) -1.164e-03 4.163e-03 -0.280 0.78085
## I(covid4 * study1) 3.867e-03 8.753e-03 0.442 0.66042
## I(covid4 * study2) -1.529e-02 1.349e-02 -1.133 0.26203
## I(covid4 * study3) 1.326e-02 1.031e-02 1.286 0.20409
## I(covid4 * study4) -7.318e-04 4.550e-03 -0.161 0.87281
## I(study1 * study2) -2.597e-03 5.237e-03 -0.496 0.62197
## I(study1 * study3) 2.359e-03 4.783e-03 0.493 0.62381
## I(study1 * study4) 2.418e-03 2.891e-03 0.836 0.40663
## I(study2 * study3) -4.731e-03 5.117e-03 -0.925 0.35926
## I(study2 * study4) -6.979e-04 4.039e-03 -0.173 0.86346
## I(study3 * study4) -2.782e-05 2.414e-03 -0.012 0.99085
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1921 on 54 degrees of freedom
## Multiple R-squared:  0.996, Adjusted R-squared:  0.9895
## F-statistic: 152.5 on 88 and 54 DF, p-value: < 2.2e-16

```