STA303/1002: Mixed assessment 1

Starship crew analysis

Chief Science Officer [Yukun Gao]; ID: [1006112564]

```
packages_needed <- c("tidyverse", "devtools", "lme4",
                     "lattice", "lmtest", "randomNames")

package.check <- lapply(
  packages_needed,
  FUN = function(x) {
    if (!require(x, character.only = TRUE)) {
      install.packages(x, dependencies = TRUE,
      repos = "https://cloud.r-project.org/")
    }
  }
)

rm(packages_needed, package.check)
devtools::install_github("elb0/myStarship", force = TRUE)
```

```
library(tidyverse)
library(lme4)
library(myStarship)

knitr::opts_chunk$set(eval = TRUE)
```

```
get_my_starship(1006112564)
```

```
glimpse(crew_data)
```

```
## Rows: 3,012
## Columns: 13
## $ crew_id            <dbl> 42015, 42015, 42015, 42015, 42015, 42015, 42015, 42~
## $ rank               <chr> "Captain", "Captain", "Captain", "Captain", "Captai~
## $ position           <chr> "Captain", "Captain", "Captain", "Captain", "Captai~
## $ division           <chr> "Command", "Command", "Command", "Command", "Comman~
## $ sub_division       <chr> "Command", "Command", "Command", "Command", "Comman~
## $ gender             <chr> "Feminine", "Feminine", "Feminine", "Feminine", "Fe~
## $ name               <chr> "Angelique Cuthair", "Angelique Cuthair", "Angeliqu~
## $ duty_shift         <chr> "Alpha", "Alpha", "Alpha", "Alpha", "Alpha", "Alpha~
## $ shift_team         <chr> "Team 1", "Team 1", "Team 1", "Team 1", "Team 1", "~
## $ starfleet_gpa      <dbl> 7.52, 7.52, 7.52, 7.52, 7.52, 7.52, 7.52, 7.52, 7.5~
## $ perseverance_score <dbl> 6.36, 6.36, 6.36, 6.36, 6.36, 6.36, 6.36, 6.36, 6.3~
## $ week               <int> 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 1, 2, 3, 4, ~
## $ productivity       <dbl> 36.15745, 34.34976, 34.43521, 33.98903, 38.55578, 3~
```

Task set 1:

1. What is the name of your ship?

```
ship_name
```

```
## [1] "SS Swuil"
```

My ship_name is “SS Swuil”.

2. What is the name of the Communications Officer?

```
crew_data%>% filter(position=="Communications Officer") %>%select(name)
```

```
## # A tibble: 12 x 1
##    name
##    <chr>
##  1 Corie Johnson
##  2 Corie Johnson
##  3 Corie Johnson
##  4 Corie Johnson
##  5 Corie Johnson
##  6 Corie Johnson
##  7 Corie Johnson
##  8 Corie Johnson
##  9 Corie Johnson
## 10 Corie Johnson
## 11 Corie Johnson
## 12 Corie Johnson
```

The name of the Communications Officer is Corie Johnson

3. How many crewmembers are in this dataset?

```
df<-unique(crew_data$name)
length(df)
```

```
## [1] 251
```

There are 251 crewmembers in this dataset.

Task set 2:

1. The Records Officer lets your know that there is a typo in the crew dataset, where 'Engineering' has been misspelled somewhere, (maybe in one of the position titles?) but unfortunately they can't remember where or how. Find the mistake, fix it (and save that fix in the original `crew_data`) and then calculate what proportion of people in the Engineering subdivision have 'engineer' or 'engineering' in their position title.

```
crew_data <-crew_data%>% mutate(position=str_replace(position, "Enigneering","Engineering"))

people<-crew_data%>% filter(sub_division=="Engineering")%>%
  filter(position=="Engineer"|position=="Chief Engineer"|position=="Engineering Technician")

people1<- crew_data%>% filter(sub_division=="Engineering")

length(unique(people$name))/length(unique(people1$name))
```

```
## [1] 0.6206897
```

About 62.07% of people in the Engineering subdivision have 'engineer' or 'engineering' in their position title.

2. Create a new variable in `crew_data` called `full_team` that indicates both the duty shift and the team each person is assigned to.

```
crew_data<- crew_data %>% mutate(full_team =str_c(duty_shift, shift_team, sep=" "))
```

Task set 3:

1. Create a new dataset called `week1` that filters to only the observations for week 1. You must also reverse the levels of the `duty_shift` factor in `week1` so that the order is: Gamma, Delta, Beta, Alpha. You can test if you've achieved this by running `table(week1$duty_shift)`. The table should be ordered with Gamma first.

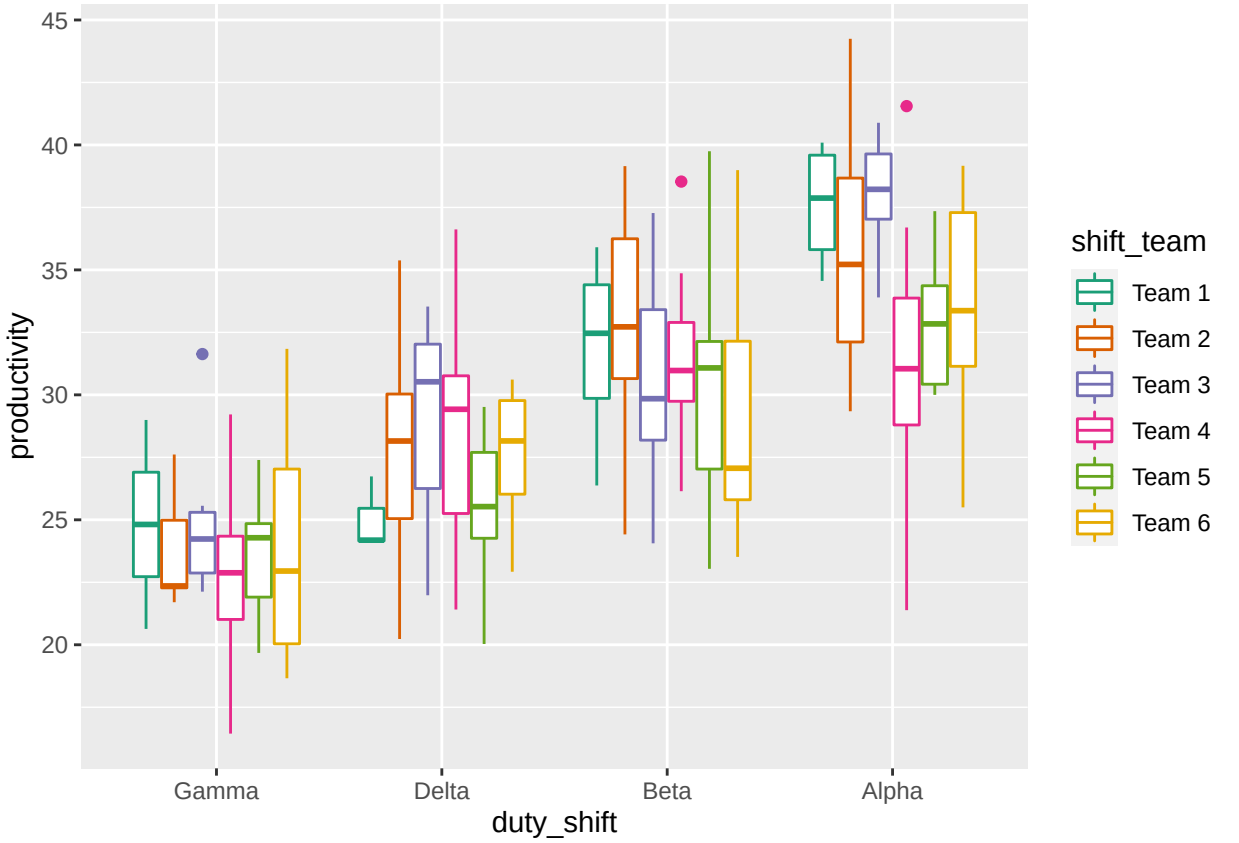
```
week1<- crew_data %>% filter(week==1)

week1$duty_shift = factor(week1$duty_shift, levels=c("Gamma","Delta","Beta","Alpha"))

#table(week1$duty_shift)
```

2. Using the `week1` dataset you created, create a plot with `productivity` on the y-axis, `duty_shift` on the x-axis and coloured boxplots for each `shift_team`. Use the "Dark2" colour palette from colour brewer.

```
week1 %>% ggplot(aes(x=duty_shift,y=productivity,colour=shift_team))+
  geom_boxplot()+scale_colour_brewer(palette="Dark2")
```



3. Using the `week1` data, fit a linear model called `w1_shift` where `productivity` is the response and `duty_shift` is the only predictor. Run `summary` and `confint` on the model.

```
w1_shift <- lm(productivity~duty_shift, data=week1)
summary(w1_shift)
```

```
##
## Call:
## lm(formula = productivity ~ duty_shift, data = week1)
```

```
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -12.8373  -3.0381  -0.2167   2.8567  10.0249
##
## Coefficients:
##                 Estimate Std. Error t value Pr(>|t|)
## (Intercept)      23.8230     0.5996  39.729  < 2e-16 ***
## duty_shiftDelta   3.3959     0.8309   4.087 5.91e-05 ***
## duty_shiftBeta    6.9670     0.7597   9.170  < 2e-16 ***
## duty_shiftAlpha  10.3986     0.7543  13.786  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 4.067 on 247 degrees of freedom
## Multiple R-squared:  0.468,  Adjusted R-squared:  0.4615
## F-statistic: 72.43 on 3 and 247 DF,  p-value: < 2.2e-16
```

```
confint(w1_shift)
```

```
##                     2.5 %    97.5 %
## (Intercept)     22.641982 25.004066
## duty_shiftDelta  1.759408  5.032408
## duty_shiftBeta   5.470672  8.463409
## duty_shiftAlpha  8.912994 11.884228
```

4. Fit three additional linear models and run summaries on them:

```
w1_team <-lm(productivity~shift_team, data=week1)
w1_int<-lm(productivity~duty_shift*shift_team, data=week1)
w1_full<-lm(productivity~full_team, data=week1)

summary(w1_team)
```

```
##
## Call:
## lm(formula = productivity ~ shift_team, data = week1)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -12.5672  -4.2693   0.3605   3.7407  12.6896
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)       31.8374     1.4129  22.533   <2e-16 ***
## shift_teamTeam 2  -0.2805     1.5851  -0.177   0.8597
## shift_teamTeam 3  -1.6484     1.7743  -0.929   0.3538
## shift_teamTeam 4  -2.8247     1.5910  -1.775   0.0771 .
## shift_teamTeam 5  -2.7706     1.5910  -1.741   0.0829 .
## shift_teamTeam 6  -2.9592     1.6568  -1.786   0.0753 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 5.472 on 245 degrees of freedom
## Multiple R-squared:  0.04458,    Adjusted R-squared:  0.02508
## F-statistic: 2.286 on 5 and 245 DF,  p-value: 0.0468
```

```r
summary(w1_int)
```

```
##
## Call:
## lm(formula = productivity ~ duty_shift * shift_team, data = week1)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -10.0254  -2.6052  -0.1764   2.4819  10.1425
##
## Coefficients:
##                                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)                       24.81459    2.77932   8.928  < 2e-16 ***
## duty_shiftDelta                    0.20014    3.58809   0.056   0.9556
## duty_shiftBeta                     6.98669    3.40396   2.053   0.0413 *
## duty_shiftAlpha                   12.79912    3.20928   3.988 8.98e-05 ***
## shift_teamTeam 2                  -1.07294    3.15145  -0.340   0.7338
## shift_teamTeam 3                   0.00184    3.10738   0.001   0.9995
## shift_teamTeam 4                  -1.66681    3.02144  -0.552   0.5817
## shift_teamTeam 5                  -1.09095    3.07265  -0.355   0.7229
## shift_teamTeam 6                  -1.10699    3.07265  -0.360   0.7190
## duty_shiftDelta:shift_teamTeam 2   3.80760    4.01389   0.949   0.3438
## duty_shiftBeta:shift_teamTeam 2    2.21925    3.85973   0.575   0.5659
## duty_shiftAlpha:shift_teamTeam 2  -0.78614    3.63439  -0.216   0.8289
## duty_shiftDelta:shift_teamTeam 3   3.66244    4.46713   0.820   0.4132
## duty_shiftBeta:shift_teamTeam 3   -1.53928    3.90316  -0.394   0.6937
## duty_shiftAlpha:shift_teamTeam 3   0.37971    3.84780   0.099   0.9215
## duty_shiftDelta:shift_teamTeam 4   4.78430    3.94541   1.213   0.2265
## duty_shiftBeta:shift_teamTeam 4    1.03878    3.72830   0.279   0.7808
## duty_shiftAlpha:shift_teamTeam 4  -4.53723    3.55943  -1.275   0.2037
## duty_shiftDelta:shift_teamTeam 5   1.35181    4.01695   0.337   0.7368
## duty_shiftBeta:shift_teamTeam 5   -0.69977    3.75180  -0.187   0.8522
## duty_shiftAlpha:shift_teamTeam 5  -3.50734    3.59512  -0.976   0.3303
## duty_shiftDelta:shift_teamTeam 6   3.70391    4.09854   0.904   0.3671
## duty_shiftBeta:shift_teamTeam 6   -1.60742    3.81981  -0.421   0.6743
## duty_shiftAlpha:shift_teamTeam 6  -3.22036    3.64740  -0.883   0.3782
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 3.931 on 227 degrees of freedom
## Multiple R-squared:  0.5433, Adjusted R-squared:  0.497
## F-statistic: 11.74 on 23 and 227 DF,  p-value: < 2.2e-16
```

```r
summary(w1_full)
```

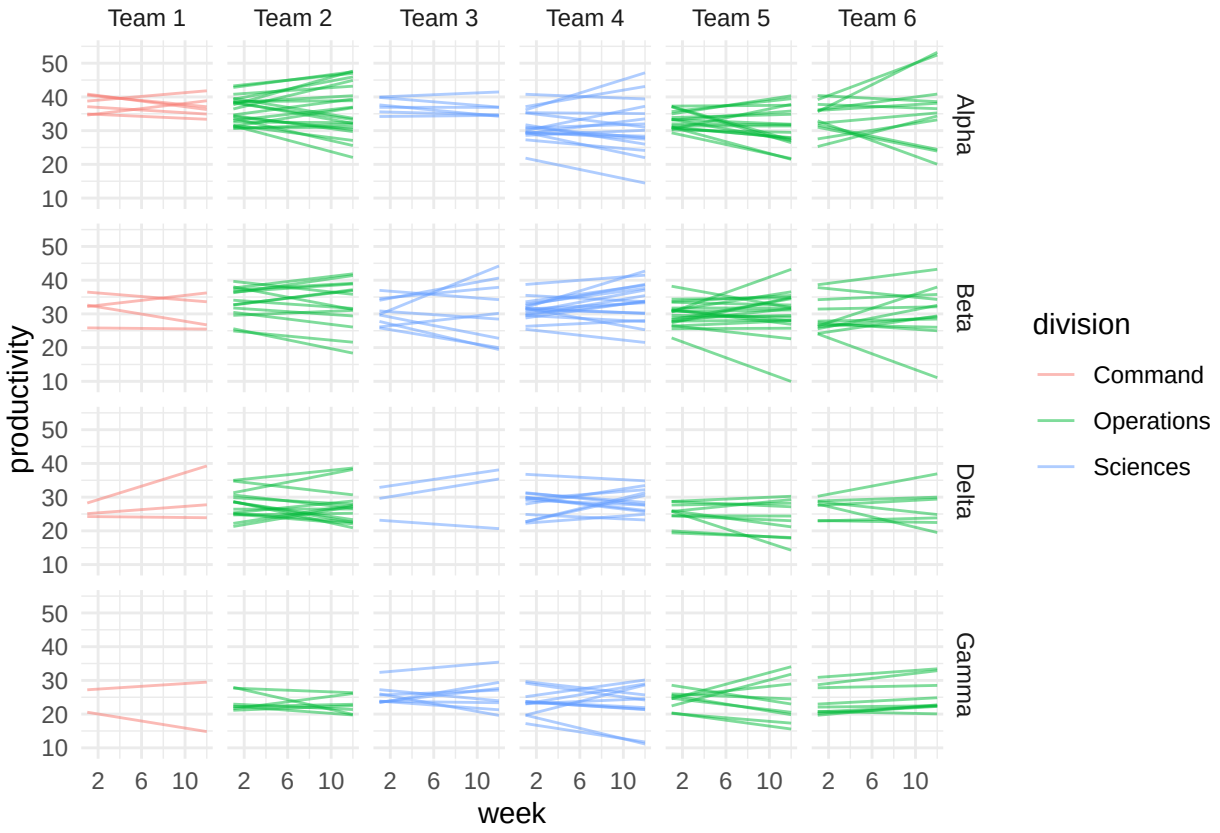
```
##
## Call:
## lm(formula = productivity ~ full_team, data = week1)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -10.0254  -2.6052  -0.1764   2.4819  10.1425
##
## Coefficients:
```

```
##                         Estimate Std. Error t value Pr(>|t|)
## (Intercept)              37.6137     1.6046  23.441  < 2e-16 ***
## full_teamAlpha Team 2    -1.8591     1.8103  -1.027 0.305534
## full_teamAlpha Team 3     0.3816     2.2693   0.168 0.866627
## full_teamAlpha Team 4    -6.2040     1.8816  -3.297 0.001133 **
## full_teamAlpha Team 5    -4.5983     1.8665  -2.464 0.014496 *
## full_teamAlpha Team 6    -4.3273     1.9653  -2.202 0.028679 *
## full_teamBeta Team 1     -5.8124     2.5372  -2.291 0.022886 *
## full_teamBeta Team 2     -4.6661     1.9179  -2.433 0.015752 *
## full_teamBeta Team 3     -7.3499     2.0716  -3.548 0.000472 ***
## full_teamBeta Team 4     -6.4405     1.8665  -3.451 0.000667 ***
## full_teamBeta Team 5     -7.6031     1.8296  -4.156 4.60e-05 ***
## full_teamBeta Team 6     -8.5268     1.9653  -4.339 2.16e-05 ***
## full_teamDelta Team 1   -12.5990     2.7793  -4.533 9.40e-06 ***
## full_teamDelta Team 2    -9.8643     1.8986  -5.195 4.54e-07 ***
## full_teamDelta Team 3    -8.9347     2.7793  -3.215 0.001496 **
## full_teamDelta Team 4    -9.4815     1.9653  -4.825 2.57e-06 ***
## full_teamDelta Team 5   -12.3381     2.0297  -6.079 5.08e-09 ***
## full_teamDelta Team 6   -10.0021     2.1868  -4.574 7.87e-06 ***
## full_teamGamma Team 1   -12.7991     3.2093  -3.988 8.98e-05 ***
## full_teamGamma Team 2   -13.8721     2.1868  -6.344 1.20e-09 ***
## full_teamGamma Team 3   -12.7973     2.1227  -6.029 6.63e-09 ***
## full_teamGamma Team 4   -14.4659     1.9948  -7.252 6.42e-12 ***
## full_teamGamma Team 5   -13.8901     2.0716  -6.705 1.58e-10 ***
## full_teamGamma Team 6   -13.9061     2.0716  -6.713 1.51e-10 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 3.931 on 227 degrees of freedom
## Multiple R-squared:  0.5433, Adjusted R-squared:  0.497
## F-statistic: 11.74 on 23 and 227 DF,  p-value: < 2.2e-16
```

Task set 4:

1. Replace the 1s and add whatver other aesthetics are required in the aesthetic statement in the `ggplot()` function to recreate the graph below for your particular ship. Note that each line represents the productivity trend for one crewmember over the 12 week period.

```
crew_data %>%
  ggplot(aes(y = productivity, x = week, group = crew_id, colour = division)) +
  geom_line(stat="smooth", method = "lm", formula = 'y~x', alpha = 0.5) +
  facet_grid(duty_shift~shift_team) +
  scale_x_continuous(breaks = seq(2,12, by = 4)) +
  theme_minimal()
```




```
lmerControl(optCtrl=list(xtol_abs=1e-8,
                         ftol_abs=1e-8,
                         optimizer = "Nelder_Mead"))
```

```
## $optimizer
## [1] "nloptwrap"
##
## $restart_edge
## [1] TRUE
##
## $boundary.tol
## [1] 1e-05
##
## $calc.derivs
```

```
## [1] TRUE
##
## $use.last.params
## [1] FALSE
##
## $checkControl
## $checkControl$check.nobs.vs.rankZ
## [1] "ignore"
##
## $checkControl$check.nobs.vs.nlev
## [1] "stop"
##
## $checkControl$check.nlev.gtreq.5
## [1] "ignore"
##
## $checkControl$check.nlev.gtr.1
## [1] "stop"
##
## $checkControl$check.nobs.vs.nRE
## [1] "stop"
##
## $checkControl$check.rankX
## [1] "message+drop.cols"
##
## $checkControl$check.scaleX
## [1] "warning"
##
## $checkControl$check.formula.LHS
## [1] "stop"
##
##
## $checkConv
## $checkConv$check.conv.grad
## $checkConv$check.conv.grad$action
## [1] "warning"
##
## $checkConv$check.conv.grad$tol
## [1] 0.002
##
## $checkConv$check.conv.grad$relTol
## NULL
##
##
## $checkConv$check.conv.singular
## $checkConv$check.conv.singular$action
## [1] "message"
##
## $checkConv$check.conv.singular$tol
## [1] 1e-04
##
##
## $checkConv$check.conv.hess
## $checkConv$check.conv.hess$action
## [1] "warning"
```

```
##
## $checkConv$check.conv.hess$tol
## [1] 1e-06
##
##
##
## $optCtrl
## $optCtrl$xtol_abs
## [1] 1e-08
##
## $optCtrl$ftol_abs
## [1] 1e-08
##
## $optCtrl$optimizer
## [1] "Nelder_Mead"
##
##
## attr(,"class")
## [1] "lmerControl" "merControl"
```

```
model_1a <- lmer(productivity ~ week + starfleet_gpa + perseverance_score +
                   (1|name),
                 data = crew_data)

model_1b <- lmer(productivity ~ week + starfleet_gpa + perseverance_score +
                   (1 + week|name),
                 data = crew_data)

lmtest::lrtest(model_1a, model_1b)
```

```
## Likelihood ratio test
##
## Model 1: productivity ~ week + starfleet_gpa + perseverance_score + (1 |
##     name)
## Model 2: productivity ~ week + starfleet_gpa + perseverance_score + (1 +
##     week | name)
##   #Df  LogLik Df  Chisq Pr(>Chisq)
## 1   6 -6855.1
## 2   8 -5391.7  2 2926.8  < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
model_2a <- lmer(productivity ~ week + starfleet_gpa + perseverance_score +
                   (1 + week|name) + (1|duty_shift:shift_team),
                 data = crew_data)

model_2b <- lmer(productivity ~ week + starfleet_gpa + perseverance_score +
                   (1 + week|name) + (1|full_team),
                 data = crew_data)

lmtest::lrtest(model_1b, model_2a)
```

```
## Likelihood ratio test
##
## Model 1: productivity ~ week + starfleet_gpa + perseverance_score + (1 +
```

```
##     week | name)
## Model 2: productivity ~ week + starfleet_gpa + perseverance_score + (1 +
##     week | name) + (1 | duty_shift:shift_team)
##   #Df  LogLik Df  Chisq Pr(>Chisq)
## 1   8 -5391.7
## 2   9 -5303.9  1 175.61  < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
lmtest::lrtest(model_2a, model_2b)
```

```
## Likelihood ratio test
##
## Model 1: productivity ~ week + starfleet_gpa + perseverance_score + (1 +
##     week | name) + (1 | duty_shift:shift_team)
## Model 2: productivity ~ week + starfleet_gpa + perseverance_score + (1 +
##     week | name) + (1 | full_team)
##   #Df  LogLik Df Chisq Pr(>Chisq)
## 1   9 -5303.9
## 2   9 -5303.9  0     0          1
```

2. Determine which model from the above is the most appropriate out of those shown. Make appropriate alterations to `model_3` so that it will be the same as your chosen model with the addition of the term shown below, and uses the appropriate likelihood method to allow you to compare the models.

```
model_3 <- lmer(productivity ~ week + starfleet_gpa + perseverance_score +
                  (1 + week|name) +(1 + week|full_team),  data = crew_data)
```

```
## boundary (singular) fit: see ?isSingular
```

```
lmtest::lrtest(model_2b, model_3)
```

```
## Likelihood ratio test
##
## Model 1: productivity ~ week + starfleet_gpa + perseverance_score + (1 +
##     week | name) + (1 | full_team)
## Model 2: productivity ~ week + starfleet_gpa + perseverance_score + (1 +
##     week | name) + (1 + week | full_team)
##   #Df  LogLik Df  Chisq Pr(>Chisq)
## 1   9 -5303.9
## 2  11 -5303.9  2 0.0132     0.9934
```

3. Run `summary()` and `confint()` on whichever model you think is the most appropriate

```
summary(model_2b)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: productivity ~ week + starfleet_gpa + perseverance_score + (1 +
##     week | name) + (1 | full_team)
##    Data: crew_data
##
## REML criterion at convergence: 10607.8
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.1028 -0.6062 -0.0106  0.6062  3.1244
##
## Random effects:
```

```
##  Groups    Name        Variance Std.Dev. Corr
##  name      (Intercept)  8.6454  2.9403
##            week         0.2149  0.4636   0.02
##  full_team (Intercept) 16.5882  4.0729
##  Residual               0.9786  0.9892
## Number of obs: 3012, groups:  name, 251; full_team, 24
##
## Fixed effects:
##                     Estimate Std. Error t value
## (Intercept)          6.94358    2.10634   3.297
## week                 0.01273    0.02972   0.428
## starfleet_gpa        1.85072    0.19049   9.716
## perseverance_score   1.17978    0.20282   5.817
##
## Correlation of Fixed Effects:
##             (Intr) week   strfl_
## week        -0.001
## starflet_gp -0.609  0.000
## prsvrnc_scr -0.609  0.000 -0.110
```

```
confint(model_2b)
```

```
## Computing profile confidence intervals ...
```

```
##                           2.5 %      97.5 %
## .sig01               2.66563068  3.22998703
## .sig02              -0.11482839  0.15020617
## .sig03               0.42368643  0.50760525
## .sig04               3.00061134  5.52961730
## .sigma               0.96247586  1.01723076
## (Intercept)          2.80743769 11.07575269
## week                -0.04563621  0.07109614
## starfleet_gpa        1.47529230  2.22623780
## perseverance_score   0.78298007  1.57818228
```

Task set 5:

- `astrobiologists` is a list of all the astrobiology crewmembers
- `competition_data` has the number of plants of each type that each participating astrobiologist recorded.
- `origin_data` contains information from the hotel about the plants in their collection and the the planets they are native to. They have warned you that is may be somewhat incomplete.

```
astrobiologists <- crew_data %>%
  filter(position == "Astrobiologist") %>%
  distinct(crew_id, name, .keep_all=TRUE) %>%
  transmute(crewmember = str_c(name, " (", crew_id, ")"))

competition_data <- tibble(crewmember =
                           c(astrobiologists$crewmember[1],
                           astrobiologists$crewmember[2],
                           astrobiologists$crewmember[3]),
          `Xupta tree` = c(3L, 7L, NA),
            `L'maki` = c(21L, NA, 21L),
          `Leola root` = c(40L, 45L, 26L),
            Klavaatu = c(2L, 3L, 2L),
           Waterplum = c(NA, 5L, 1L),
  `Folnar jewel plant` = c(17L, 12L, 10L),
        `Felaran rose` = c(28L, 7L, NA),
           Crystilia = c(12L, 3L, 9L),
             Parthas = c(4L, 3L, NA),
        `Borgia plant` = c(NA, 1L, 1L))


origin_data <- data.frame(plant = c("Xupta tree","L'maki","Leola root",
                                    "Waterplum","Vulcan orchid",
                                    "Lunar flower","Garlanic tree",
                                    "Folnar jewel plant",
                                    "Felaran rose","Crystilia","Parthas",
                                    "Borgia plant","Pod plant"),
                          native_to = c("Orellius system","Delta Quadrant",
                                    "Bajor","Mari","Vulcan",
                                    NA,"Elaysian homeworld","Folnar III",
                                    "Delta Quadrant","Telemarius IV",
                                    "Acamar III","M-113",NA))
```

```
complete_comp <-competition_data %>%
  pivot_longer(-c(crewmember),
               names_to="plant",values_to="number")


complete_comp<-left_join(origin_data, complete_comp)  %>%
  filter(!is.na(number)) %>%distinct(crewmember,native_to)%>%
  group_by(crewmember)%>%mutate(howmanynumber=length(unique(native_to)))
```

```
## Joining, by = "plant"
```

Cissy Yazawa (42045): 6 Ellen Briggs (42074): 8 Shafaaa el-Neman (42215): 6

Task set 6:

Suppose you were trying to run the following code. It throws an error. (Note: DON'T fix the error, that isn't the point of this activity.) Create a reprex (a reproducible example, see week 1) with everything required for your statistician to reproduce this error. The only 'error' in the output should be the one produced by *this* code. (Hint: there is a library you should include, and you'll also need to provide the data. Once you've copied the complete code for the reprex to your clipboard, you can then run `reprex()` and the content for your reprex will then be added to you clipboard, (i.e., with Ctrl+V or Cmd+V you can paste it.))

```
library(tidyverse)
origin_data <- data.frame(plant = c("Xupta tree","L'maki","Leola root",
                                    "Waterplum","Vulcan orchid",
                                    "Lunar flower","Garlanic tree",
                                    "Folnar jewel plant",
                                    "Felaran rose","Crystilia","Parthas",
                                    "Borgia plant","Pod plant"),
                          native_to = c("Orellius system","Delta Quadrant",
                                    "Bajor","Mari","Vulcan",
                                    NA,"Elaysian homeworld","Folnar III",
                                    "Delta Quadrant","Telemarius IV",
                                    "Acamar III","M-113",NA))

origin_data%>%
  filter(nativeto == "Delta Quadrant")
```

```
library(reprex)
reprex()
```