

Final MATH 208 (Question 1)

260869949
Prsa Yadollahi
MATH 208 - Final

```
data("STAR")
STAR <- STAR[c('stark', 'star1', 'readk', 'read1', 'read2')]
STAR <- na.omit(STAR)
STAR <- tibble::rowid_to_column(STAR, "student_ID")
STAR_data = STAR
str(STAR_data)
```

```
## 'data.frame': 3114 obs. of 6 variables:
## $ student_ID: int 1 2 3 4 5 6 7 8 9 10 ...
## $ stark : Factor w/ 3 levels "regular","small",...: 2 2 1 2 1 1 2 2 1 3 ...
## $ star1 : Factor w/ 3 levels "regular","small",...: 2 2 1 2 1 1 2 2 1 3 ...
## $ readk : int 447 450 448 447 431 451 478 455 430 437 ...
## $ read1 : int 507 579 651 533 558 548 514 530 490 503 ...
## $ read2 : int 568 588 614 608 608 596 569 608 622 552 ...
## - attr(*, "na.action")= 'omit' Named int [1:8484] 1 4 5 6 7 8 9 10 14 15 ...
## ..- attr(*, "names")= chr [1:8484] "1122" "1160" "1183" "1195" ...
```

```
STAR_data %>% slice(sample(1:n(),5))
```

```
## student_ID stark star1 readk read1 read2
## 1 2476 regular+aide regular 448 448 520
## 2 1953 small small 503 629 669
## 3 1749 regular+aide regular+aide 538 553 588
## 4 2541 small regular 450 548 631
## 5 1837 regular+aide regular+aide 565 629 669
```

(A)

```
STAR_data %>% group_by(stark) %>% summarise(n=n(), .groups = 'drop')
```

```
## # A tibble: 3 x 2
## stark n
## <fct> <int>
## 1 regular 1067
## 2 small 987
## 3 regular+aide 1060
```

(B)

```
count_table = STAR_data %>% group_by(stark, star1) %>% summarise(n=n(), .groups = 'drop')
count_table
```

```
## # A tibble: 9 x 3
##   stark      star1      n
##   <fct>      <fct>    <int>
## 1 regular    regular    518
## 2 regular    small      85
## 3 regular    regular+aide 464
## 4 small      regular     29
## 5 small      small     924
## 6 small      regular+aide 34
## 7 regular+aide regular    491
## 8 regular+aide small      85
## 9 regular+aide regular+aide 484
```

(C)

```
count_table %>% mutate(proportion=n/sum(n)) %>% select(-n)
```

```
## # A tibble: 9 x 3
##   stark      star1    proportion
##   <fct>      <fct>      <dbl>
## 1 regular    regular    0.166
## 2 regular    small    0.0273
## 3 regular    regular+aide 0.149
## 4 small      regular    0.00931
## 5 small      small    0.297
## 6 small      regular+aide 0.0109
## 7 regular+aide regular    0.158
## 8 regular+aide small    0.0273
## 9 regular+aide regular+aide 0.155
```

(D)

```
STAR_what <- STAR_data %>%
  pivot_longer(cols=readk:read2,names_to="Test",values_to="Score") %>%
  select(-student_ID)
class(STAR_what)
```

```
## [1] "tbl_df"      "tbl"        "data.frame"
```

(E)

```
STAR_who_denom <- xtabs(~star1+Test+stark,data=STAR_what)
STAR_who_denom[1,3,2]
```

```
## [1] 29
```

(F)

```
STAR_who_num <- xtabs(Score~star1+Test+stark,data=STAR_what)
STAR_avg <- STAR_who_num / STAR_who_denom
STAR_avg
```

```
## , , stark = regular
##
##           Test
## star1      read1  read2  readk
## regular    528.4324 591.1931 441.6950
## small      538.7882 597.4706 443.0588
## regular+aide 537.8879 596.3578 443.1509
##
## , , stark = small
##
##           Test
## star1      read1  read2  readk
## regular    530.8966 586.5172 435.0690
## small      541.9621 597.9199 447.6277
## regular+aide 539.3529 602.5882 439.0294
##
## , , stark = regular+aide
##
##           Test
## star1      read1  read2  readk
## regular    532.0163 591.6253 444.5458
## small      524.6588 579.6471 436.1176
## regular+aide 534.1198 591.6178 440.0413
```

(G)

```
avg_read2 = STAR_avg[,2,]
avg_readk = STAR_avg[,3,]
diff_avg_read2_readk = avg_read2 - avg_readk
diff_avg_read2_readk
```

```
##           stark
## star1      regular  small regular+aide
## regular    149.4981 151.4483 147.0794
## small      154.4118 150.2922 143.5294
## regular+aide 153.2069 163.5588 151.5764
```

(H)

```
STAR_what %>%
  group_by(star1, stark, Test) %>%
  summarise(new = sum(Score)/n(), .groups = 'drop') %>%
  pivot_wider(names_from = Test, values_from = new) %>%
  mutate(new = read2 - readk) %>%
  select(star1, stark, new) %>%
  pivot_wider(names_from = stark, values_from = new)
```

```
## # A tibble: 3 x 4
##   star1      regular small 'regular+aide'
##   <fct>      <dbl> <dbl>      <dbl>
## 1 regular    149.  151.      147.
## 2 small      154.  150.      144.
## 3 regular+aide 153.  164.      152.
```