homework_4_kanutala_santosh

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My Github repository for my assignments can be found at below URL: (https://github.com/santumagic/compscix-415-2assignments.git)

```
library(tidyverse)
library(mdsr)
library(nycflights13)
```

Section 5.6.7: #2, #4 and #6 only. Extra Credit: Do #5

QUESTION 2:

```
# First lets find the not cancelled flights.
not_cancelled <- flights %>%
  filter(!is.na(dep_delay), !is.na(arr_delay))

# given code for not_cancelled %>% count(dest)
not_cancelled %>%
  count(dest)
```

```
## # A tibble: 104 x 2
##    dest       n
##    <chr> <int>
##  1 ABQ     254
##  2 ACK     264
##  3 ALB     418
##  4 ANC       8
##  5 ATL   16837
##  6 AUS    2411
##  7 AVL     261
##  8 BDL     412
##  9 BGR     358
## 10 BHM     269
## # ... with 94 more rows
```

```
# new code for not_cancelled %>% count(dest) by group by and summarise
not_cancelled %>%
  group_by(dest) %>%
  summarise(n = n())
```

```
## # A tibble: 104 x 2
##    dest       n
##    <chr> <int>
##  1 ABQ     254
##  2 ACK     264
##  3 ALB     418
##  4 ANC       8
##  5 ATL   16837
##  6 AUS    2411
##  7 AVL     261
##  8 BDL     412
##  9 BGR     358
## 10 BHM     269
## # ... with 94 more rows
```

```
# given code for not_cancelled %>% count(tailnum, wt = distance)
not_cancelled %>%
  count(tailnum, wt = distance)
```

```
## # A tibble: 4,037 x 2
##    tailnum      n
##    <chr>    <dbl>
##  1 D942DN    3418
##  2 N0EGMQ  239143
##  3 N10156  109664
##  4 N102UW   25722
##  5 N103US   24619
##  6 N104UW   24616
##  7 N10575  139903
##  8 N105UW   23618
##  9 N107US   21677
## 10 N108UW   32070
## # ... with 4,027 more rows
```

```
# new code for not_cancelled %>% count(tailnum, wt = distance) group by and summarise
not_cancelled %>%
  group_by(tailnum) %>%
  summarize(n = sum(distance, na.rm = TRUE))
```

```
## # A tibble: 4,037 x 2
##    tailnum      n
##    <chr>    <dbl>
##  1 D942DN    3418
##  2 N0EGMQ  239143
##  3 N10156  109664
##  4 N102UW   25722
##  5 N103US   24619
##  6 N104UW   24616
##  7 N10575  139903
##  8 N105UW   23618
##  9 N107US   21677
## 10 N108UW   32070
## # ... with 4,027 more rows
```

QUESTION 4:

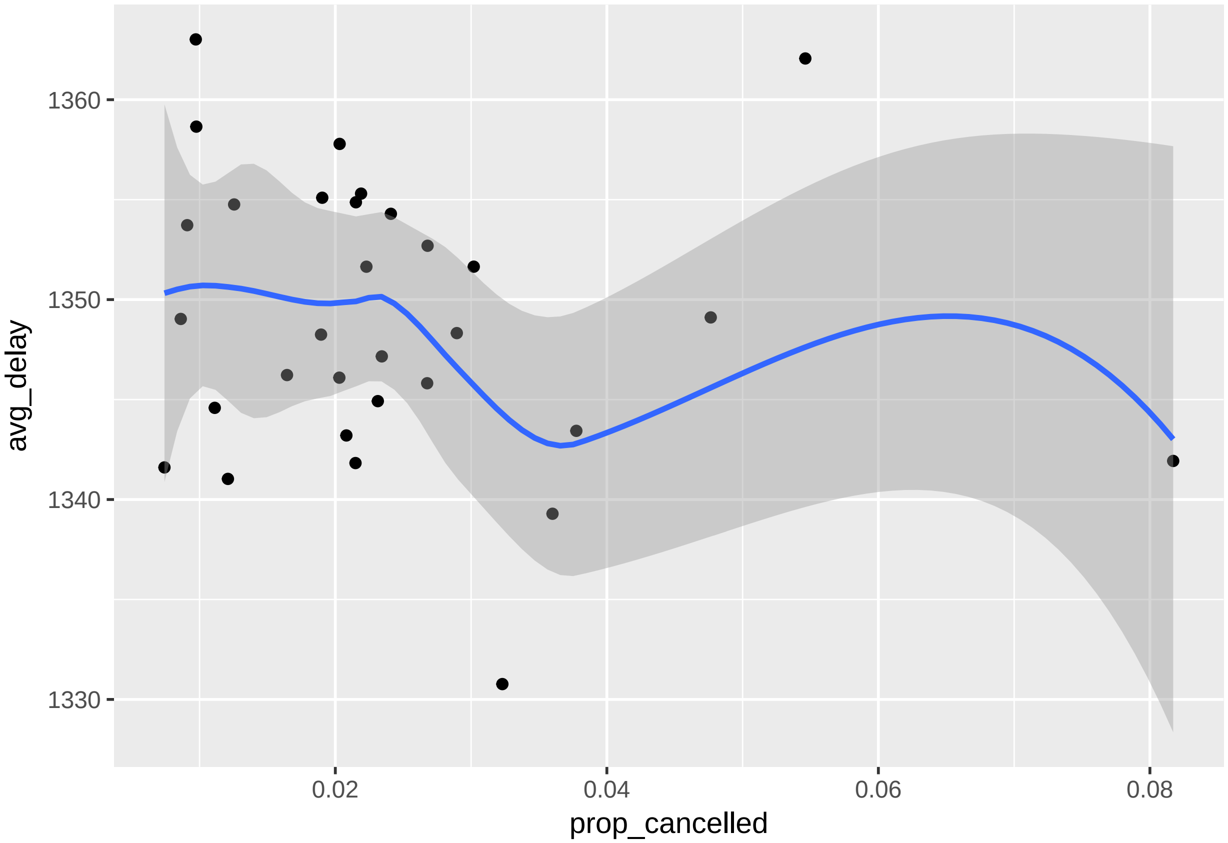
```
# number of cancelled flights per day
(cancelled_flights <- flights %>%
  filter(is.na(dep_time)) %>%
  count(day))
```

```
## # A tibble: 31 x 2
##      day     n
##    <int> <int>
##  1     1   246
##  2     2   250
##  3     3   109
##  4     4    82
##  5     5   226
##  6     6   296
##  7     7   318
##  8     8   921
##  9     9   593
## 10    10   535
## # ... with 21 more rows
```

```r
# proportion of day cancelled flights vs aerage delays
(cancelled_flights <- flights %>%
  group_by(day) %>%
  summarize(prop_cancelled = sum(is.na(dep_time)) / n(),
            avg_delay = mean(dep_time, na.rm = TRUE)))
```

```
## # A tibble: 31 x 3
##      day prop_cancelled avg_delay
##    <int>          <dbl>     <dbl>
##  1     1        0.0223      1352.
##  2     2        0.0231      1345.
##  3     3        0.00972     1363.
##  4     4        0.00741     1342.
##  5     5        0.0208      1343.
##  6     6        0.0268      1346.
##  7     7        0.0289      1348.
##  8     8        0.0817      1342.
##  9     9        0.0546      1362.
## 10    10        0.0477      1349.
## # ... with 21 more rows
```

```r
# plot for the relationship
ggplot(cancelled_flights, aes(x = prop_cancelled, y = avg_delay)) +
  geom_point() +
  geom_smooth()
```



QUESTION 6:

ANSWER 6:

sort argument will sort the elements of count () in the decending order. After the results are extracted, we can use the sort to arrange the values.

Section 10.5: #1, #2, #3 and #6 only.

QUESTION 2:

```
# mtcars as a data frame
print(mtcars)
```

```
##                      mpg cyl  disp  hp drat    wt  qsec vs am gear carb
## Mazda RX4           21.0   6 160.0 110 3.90 2.620 16.46  0  1    4    4
## Mazda RX4 Wag       21.0   6 160.0 110 3.90 2.875 17.02  0  1    4    4
## Datsun 710          22.8   4 108.0  93 3.85 2.320 18.61  1  1    4    1
## Hornet 4 Drive      21.4   6 258.0 110 3.08 3.215 19.44  1  0    3    1
## Hornet Sportabout   18.7   8 360.0 175 3.15 3.440 17.02  0  0    3    2
## Valiant             18.1   6 225.0 105 2.76 3.460 20.22  1  0    3    1
## Duster 360          14.3   8 360.0 245 3.21 3.570 15.84  0  0    3    4
## Merc 240D           24.4   4 146.7  62 3.69 3.190 20.00  1  0    4    2
## Merc 230            22.8   4 140.8  95 3.92 3.150 22.90  1  0    4    2
## Merc 280            19.2   6 167.6 123 3.92 3.440 18.30  1  0    4    4
## Merc 280C           17.8   6 167.6 123 3.92 3.440 18.90  1  0    4    4
## Merc 450SE          16.4   8 275.8 180 3.07 4.070 17.40  0  0    3    3
## Merc 450SL          17.3   8 275.8 180 3.07 3.730 17.60  0  0    3    3
## Merc 450SLC         15.2   8 275.8 180 3.07 3.780 18.00  0  0    3    3
## Cadillac Fleetwood  10.4   8 472.0 205 2.93 5.250 17.98  0  0    3    4
## Lincoln Continental 10.4   8 460.0 215 3.00 5.424 17.82  0  0    3    4
## Chrysler Imperial   14.7   8 440.0 230 3.23 5.345 17.42  0  0    3    4
## Fiat 128            32.4   4  78.7  66 4.08 2.200 19.47  1  1    4    1
## Honda Civic         30.4   4  75.7  52 4.93 1.615 18.52  1  1    4    2
## Toyota Corolla      33.9   4  71.1  65 4.22 1.835 19.90  1  1    4    1
## Toyota Corona       21.5   4 120.1  97 3.70 2.465 20.01  1  0    3    1
## Dodge Challenger    15.5   8 318.0 150 2.76 3.520 16.87  0  0    3    2
## AMC Javelin         15.2   8 304.0 150 3.15 3.435 17.30  0  0    3    2
## Camaro Z28          13.3   8 350.0 245 3.73 3.840 15.41  0  0    3    4
## Pontiac Firebird    19.2   8 400.0 175 3.08 3.845 17.05  0  0    3    2
## Fiat X1-9           27.3   4  79.0  66 4.08 1.935 18.90  1  1    4    1
## Porsche 914-2       26.0   4 120.3  91 4.43 2.140 16.70  0  1    5    2
## Lotus Europa        30.4   4  95.1 113 3.77 1.513 16.90  1  1    5    2
## Ford Pantera L      15.8   8 351.0 264 4.22 3.170 14.50  0  1    5    4
## Ferrari Dino        19.7   6 145.0 175 3.62 2.770 15.50  0  1    5    6
## Maserati Bora       15.0   8 301.0 335 3.54 3.570 14.60  0  1    5    8
## Volvo 142E          21.4   4 121.0 109 4.11 2.780 18.60  1  1    4    2
```

```
# mtcars as a tibble
print(as_tibble(mtcars))
```

```
## # A tibble: 32 x 11
##      mpg   cyl  disp    hp  drat    wt  qsec    vs    am  gear  carb
##  * <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
##  1  21       6  160    110  3.9   2.62  16.5     0     1     4     4
##  2  21       6  160    110  3.9   2.88  17.0     0     1     4     4
##  3  22.8     4  108     93  3.85  2.32  18.6     1     1     4     1
##  4  21.4     6  258    110  3.08  3.22  19.4     1     0     3     1
##  5  18.7     8  360    175  3.15  3.44  17.0     0     0     3     2
##  6  18.1     6  225    105  2.76  3.46  20.2     1     0     3     1
##  7  14.3     8  360    245  3.21  3.57  15.8     0     0     3     4
##  8  24.4     4  147.    62  3.69  3.19  20       1     0     4     2
##  9  22.8     4  141.    95  3.92  3.15  22.9     1     0     4     2
## 10  19.2     6  168.   123  3.92  3.44  18.3     1     0     4     4
## # ... with 22 more rows
```

When we print a dataframe whole records will be printed where as with the tibble only top rows will be printed and
the columns and widths are adjusted to fit the screen resolution.

QUESTION 2:

```
# with a data frame
df <- data_frame(abc = 1, xyz = 'a')
df
```

```
## # A tibble: 1 x 2
##     abc xyz
##   <dbl> <chr>
## 1     1 a
```

```r
df$x
```

```
## NULL
```

```r
df[, "xyz"]
```

```
## # A tibble: 1 x 1
##   xyz
##   <chr>
## 1 a
```

```r
df[, c("abc", "xyz")]
```

```
## # A tibble: 1 x 2
##     abc xyz
##   <dbl> <chr>
## 1     1 a
```

```r
# with a tibble
df <- tibble(abc = 1, xyz = "a")
df
```

```
## # A tibble: 1 x 2
##     abc xyz
##   <dbl> <chr>
## 1     1 a
```

```r
df$x
```

```
## NULL
```

```r
df[, "xyz"]
```

```
## # A tibble: 1 x 1
##   xyz
##   <chr>
## 1 a
```

```r
df[, c("abc", "xyz")]
```

```
## # A tibble: 1 x 2
##     abc xyz
##   <dbl> <chr>
## 1     1 a
```

By using $ we can only extract by names. tibbles are much strictier and they alert us when we are trying to pull a column which never existed.

QUESTION 3:

```r
var <- "mpg"
```

ANSWER:

We can extract the refernce variable by uisng double square brackets like df[[var]]

QUESTION 6:

```
?tibble
```

```
## Help on topic 'tibble' was found in the following packages:
##
##   Package               Library
##   tibble                /Library/Frameworks/R.framework/Versions/3.5/Resources/library
##   dplyr                 /Library/Frameworks/R.framework/Versions/3.5/Resources/library
##
##
## Using the first match ...
```

ANSWER:

```
getOption("tibble.max_extra_cols")
```

```
## NULL
```

Section 12.3.3: #2, #3 and #4 only.

QUESTION 2:

```
# table4a %>%
  # gather(1999, 2000, key = "year", value = "cases") # commented out as it is failing and need to ask
```

ANSWER:

we need to add the quotes around 1999 & 2000 otherwise 1999 & 2000 are treated as columns in the data frame. Below is the modified code.

```
table4a %>%
  gather('1999', '2000', key = "year", value = "cases")
```

```
## # A tibble: 6 x 3
##   country     year   cases
##   <chr>       <chr>  <int>
## 1 Afghanistan 1999     745
## 2 Brazil      1999   37737
## 3 China       1999  212258
## 4 Afghanistan 2000    2666
## 5 Brazil      2000   80488
## 6 China       2000  213766
```

QUESTION 3:

```
# given code
 people <- tribble(
   ~name,             ~key,    ~value,
  #-----------------|--------|------
```

```r
  "Phillip Woods",   "age",       45,
  "Phillip Woods",   "height",   186,
  "Phillip Woods",   "age",       50,
  "Jessica Cordero", "age",       37,
  "Jessica Cordero", "height",   156
)

# Spreading the above tibble
# spread(people, key, value) # commented out as it is failing and need to ask instructor
```

ANSWER:

Duplicates are identified. In otherwords Phillip has two age records. In this case we can add another column related to the row identifier like the people_id then the issue will be resolved. Below is the code for the same.

```r
people$people_id <- c(1, 1, 2, 1, 1)
people # display the modified tibble
```

```
## # A tibble: 5 x 4
##   name            key    value people_id
##   <chr>           <chr>  <dbl>     <dbl>
## 1 Phillip Woods   age       45         1
## 2 Phillip Woods   height   186         1
## 3 Phillip Woods   age       50         2
## 4 Jessica Cordero age       37         1
## 5 Jessica Cordero height   156         1
```

```r
spread(people, key, value) # spread the tibble
```

```
## # A tibble: 3 x 4
##   name            people_id   age height
##   <chr>               <dbl> <dbl>  <dbl>
## 1 Jessica Cordero         1    37    156
## 2 Phillip Woods           1    45    186
## 3 Phillip Woods           2    50     NA
```

QUESTION 4:

```r
preg <- tribble(
  ~pregnant, ~male, ~female,
  "yes",     NA,    10,
  "no",      20,    12
)
```

ANSWER:

By lokking at above tibble, we can observe that there is a missing value. So we can use gather() and add na.rm = TRUE to remove the value NA. Below is the gathered tibble with variables, pregnant, gender, count.

```r
preg %>%
  gather(key = 'gender', value = 'value', c(2:3), na.rm = TRUE)
```

```
## # A tibble: 3 x 3
##   pregnant gender value
## * <chr>    <chr>  <dbl>
## 1 no       male      20
## 2 yes      female    10
## 3 no       female    12
```

Section 12.4.3: #1 and #2 only.

QUESTION 1:

```
tibble(x = c("a,b,c", "d,e,f,g", "h,i,j")) %>%
  separate(x, c("one", "two", "three"))
```

```
## # A tibble: 3 x 3
##   one   two   three
##   <chr> <chr> <chr>
## 1 a     b     c
## 2 d     e     f
## 3 h     i     j
```

```
tibble(x = c("a,b,c", "d,e", "f,g,i")) %>%
  separate(x, c("one", "two", "three"))
```

```
## # A tibble: 3 x 3
##   one   two   three
##   <chr> <chr> <chr>
## 1 a     b     c
## 2 d     e     <NA>
## 3 f     g     i
```

```
# help on the separate
?separate
```

ANSWER:

‘extra’ argument controls what happens when there are too many pieces. It can drop extra values by warning or without warning or it can merge.
‘fill’ controls what happens when there are not enough piece by filling the missing values from right or left with or without a warning.

```
# using extra = "drop"
tibble(x = c("a,b,c", "d,e,f,g", "h,i,j")) %>%
  separate(x, c("one", "two", "three"), extra = "drop")
```

```
## # A tibble: 3 x 3
##   one   two   three
##   <chr> <chr> <chr>
## 1 a     b     c
## 2 d     e     f
## 3 h     i     j
```

```r
# using extra = "merge"
tibble(x = c("a,b,c", "d,e,f,g", "h,i,j")) %>%
  separate(x, c("one", "two", "three"), extra = "merge")
```

```
## # A tibble: 3 x 3
##   one   two   three
##   <chr> <chr> <chr>
## 1 a     b     c
## 2 d     e     f,g
## 3 h     i     j
```

```r
# using fill = "right"
tibble(x = c("a,b,c", "d,e", "f,g,i")) %>%
  separate(x, c("one", "two", "three"), fill = "right")
```

```
## # A tibble: 3 x 3
##   one   two   three
##   <chr> <chr> <chr>
## 1 a     b     c
## 2 d     e     <NA>
## 3 f     g     i
```

```r
# using fill = "left"
tibble(x = c("a,b,c", "d,e", "f,g,i")) %>%
  separate(x, c("one", "two", "three"), fill = "left")
```

```
## # A tibble: 3 x 3
##   one   two   three
##   <chr> <chr> <chr>
## 1 a     b     c
## 2 <NA>  d     e
## 3 f     g     i
```

QUESTION 2:

Both unite() and separate() have a remove argument. What does it do? Why would you set it to FALSE?

ANSWER:

remove argument will remove the original input columns from the output. If we change it to FALSE then the original columns are retained in the output.

Data import Excercises:

```r
# Load the baby_names file
baby_names_txt <- read.delim("/Users/skanutal/Documents/Santosh/Learning/Berkeley/baby_names.txt", sep=
# glimpse the data from txt file
glimpse(baby_names_txt)
```

```
## Observations: 30,000
## Variables: 5
## $ year <int> 1880, 1880, 1880, 1880, 1880, 1880, 1880, 1880, 1880, 188...
## $ sex  <fct> F, F, F, F, F, F, F, F, F, F, F, F, F, F, F, F, F, F, F, ...
## $ name <fct> Mary, Anna, Emma, Elizabeth, Minnie, Margaret, Ida, Alice...
## $ n    <int> 7065, 2604, 2003, 1939, 1746, 1578, 1472, 1414, 1320, 128...
## $ prop <dbl> 0.072384329, 0.026679234, 0.020521700, 0.019865989, 0.017...
```

```
# Export the .txt file as csv into a different location
baby_names_csv <- write_delim(
  baby_names_txt, delim = '|',path = "/Users/skanutal/Documents/Santosh/Learning/Berkeley/3. Intro to DS
  )
# Load the newly created csv file
baby_names_csv_final <- read.csv(
  "/Users/skanutal/Documents/Santosh/Learning/Berkeley/3. Intro to DS/Assignments/baby_names.csv", sep=
  )
# glimpse the data from the final csv file
glimpse(baby_names_csv_final)
```

```
## Observations: 30,000
## Variables: 5
## $ year <int> 1880, 1880, 1880, 1880, 1880, 1880, 1880, 1880, 1880, 188...
## $ sex  <fct> F, F, F, F, F, F, F, F, F, F, F, F, F, F, F, F, F, F, F, ...
## $ name <fct> Mary, Anna, Emma, Elizabeth, Minnie, Margaret, Ida, Alice...
## $ n    <int> 7065, 2604, 2003, 1939, 1746, 1578, 1472, 1414, 1320, 128...
## $ prop <dbl> 0.072384329, 0.026679234, 0.020521700, 0.019865989, 0.017...
```