R Commands for Quantitative Variables

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Birth Weights and Tobacco Use During Pregnancy

Are babies' birth weights affected by whether or not the mother used tobacco during pregnancy? Low birth weights are a risk factor for health problems later in life, so this is important!

Here is a data set with data on a sample of randomly selected babies who were born in North Carolina in 2004, with some information about the mother and the babies' weights in grams:

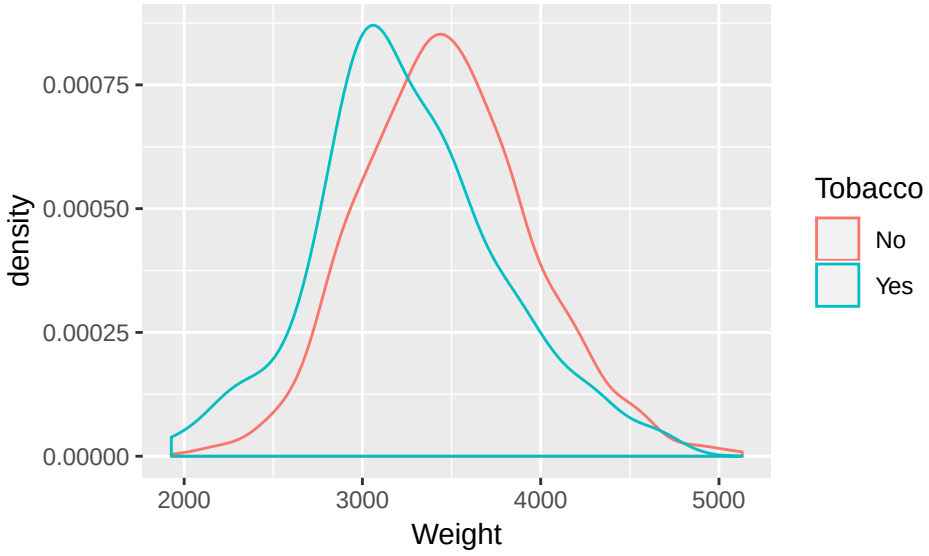
```
dim(NCBirths2004)
```

```
## [1] 1009    7
```

```
head(NCBirths2004)
```

```
##   ID MothersAge Tobacco Alcohol Gender Weight Gestation
## 1  1      30-34      No      No   Male   3827        40
## 2  2      30-34      No      No   Male   3629        38
## 3  3      35-39      No      No Female   3062        37
## 4  4      20-24      No      No Female   3430        39
## 5  5      25-29      No      No   Male   3827        38
## 6  6      35-39      No      No Female   3119        39
```

Here's a plot of the data:



Warm Up #1: What did the code to make that plot look like? Fill in the blanks below.

There are 4 blanks: what was used for data? For the aesthetic mapping to x? For the aesthetic mapping to color? For the geometry?

```
ggplot(data =                    ,
    mapping = aes(x =                , color =                )) +
  geom_                  ()
```

Warm Up #2: What statistics would you use to summarize the center and spread of the distribution of birth weights within each group?

Calculating Summaries of Quantitative Variables: `summarize` and `group_by`

We saw from the plot that there seems to be a difference in birth weights. What are "typical" birth weights for the two groups?

```
NCBirths2004 %>%
  group_by(Tobacco) %>%
  summarize(
    mean_wt = mean(Weight),
    median_wt = median(Weight),
    q1_wt = quantile(Weight, probs = 0.25),
    q3_wt = quantile(Weight, probs = 0.75),
    iqr_wt = IQR(Weight),
    var_wt = var(Weight),
    sd_wt = sd(Weight)
  )
```

```
## # A tibble: 2 x 8
##   Tobacco mean_wt median_wt q1_wt q3_wt iqr_wt  var_wt sd_wt
##   <fct>     <dbl>     <dbl> <dbl> <dbl>  <dbl>   <dbl> <dbl>
## 1 No        3472.      3459  3147 3771    624  229012.  479.
## 2 Yes       3257.      3204  2948 3530.   582. 270898.  520.
```

Note: if we wanted to just calculate these summaries for all babies combined (across both groups), we would eliminate the `group_by` command:

```
NCBirths2004 %>%
  summarize(
    mean_wt = mean(Weight),
    median_wt = median(Weight),
    q1_wt = quantile(Weight, probs = 0.25),
    q3_wt = quantile(Weight, probs = 0.75),
    iqr_wt = IQR(Weight),
    var_wt = var(Weight),
    sd_wt = sd(Weight)
  )
```

```
##   mean_wt median_wt q1_wt q3_wt iqr_wt   var_wt   sd_wt
## 1 3448.26      3430  3119  3771    652 237886.4 487.736
```

Sorting the data: `arrange`

What was the shortest gestation time?

To answer this question, we will `arrange` the babies in increasing order of gestation time. Then, the babies with the shortest gestation times will be near the `head` of the data frame.

```
NCBirths_by_gestation <- NCBirths2004 %>%
  arrange(Gestation)

head(NCBirths_by_gestation)
```

```
##   ID MothersAge Tobacco Alcohol Gender Weight Gestation
## 1  3      35-39      No      No Female   3062        37
## 2 15      30-34      No      No   Male   3232        37
## 3 20      25-29      No      No   Male   3005        37
## 4 29      15-19      No      No Female   2863        37
## 5 31      20-24      No      No   Male   2155        37
## 6 32      20-24     Yes      No Female   3062        37
```

What was the longest gestation time?

Now we want to `arrange` the babies in `desc`ending order of gestation time, so the longest gestation times will be at the `head` of the data frame:

```
NCBirths_by_gestation_descending <- NCBirths2004 %>%
  arrange(desc(Gestation))

head(NCBirths_by_gestation_descending)
```

```
##    ID MothersAge Tobacco Alcohol Gender Weight Gestation
## 1  79      30-34      No      No   Male   4139        42
## 2 165      20-24      No      No   Male   3799        42
## 3 359      20-24      No      No Female   4224        42
## 4 384      30-34      No      No Female   3572        42
## 5 521      20-24      No      No Female   3430        42
## 6 585      35-39      No      No Female   3629        42
```

Modifying or Adding a Variable: `mutate`

The babies' birth `Weights` are currently recorded in grams. Let's add a new variable to the data frame called `Weight_lbs` with the babies' birth weights in pounds.

There are about 453.6 grams in a pound. We can divide the weight in grams by 453.6 to get the weight in pounds.

```
NCBirths2004 <- NCBirths2004 %>%
  mutate(
    Weight_lbs = Weight / 453.6
  )
```

As usual, we can take a look at the results by looking at the output from `head` or `str`.

```
head(NCBirths2004)
```

```
##   ID MothersAge Tobacco Alcohol Gender Weight Gestation Weight_lbs
## 1  1      30-34      No      No   Male   3827        40   8.436949
## 2  2      30-34      No      No   Male   3629        38   8.000441
## 3  3      35-39      No      No Female   3062        37   6.750441
## 4  4      20-24      No      No Female   3430        39   7.561728
## 5  5      25-29      No      No   Male   3827        38   8.436949
## 6  6      35-39      No      No Female   3119        39   6.876102
```