

# Day 7 Cheatsheet

## Data Visualization

### Major concepts:

- The **ggplot2** package is a tidyverse package for producing graphics.
- Tidy data: Each variable forms a column and each observation forms a row.
- Having data in tidy format and long format makes creating plots easier!
- Remember to use a **+** at the end of each line when adding new layers to plots.  
Pipes like **%>%** do not work to add layers to plots, but can be used to pipe data into plots.  
**This works:** `ggplot(data = iris, aes(x = Species, y = Petal.Length)) + geom_boxplot()`  
**This works:** `iris %>% ggplot(aes(x = Species, y = Petal.Length)) + geom_boxplot()`  
**This doesn't:** `iris %>% ggplot(aes(x = Species, y = Petal.Length)) %>% geom_plot()`
- Factor: A factor is a special character vector where the elements have pre-defined groups or 'levels'. You can think of these as qualitative or categorical variables. An example is 1st grade, 2nd grade, etc. It is important to specify factors as the class **factor** so that R recognizes it as such.

### Functions

| Library/Package | Piece of code               | Example of usage  | What it does  |
|-----------------|-----------------------------|---|---|
| ggplot2         | <code>ggplot()</code>       | <code>ggplot(data = iris)</code>  | Begins a plot that is finished by adding layers.  |
| ggplot2         | <code>aes()</code>          | <code>ggplot(data = iris, aes(x = Species, y = Petal.Length))</code>                  | Aesthetic Mappings - Designates how variables in the data object will be mapped to the visual properties of the ggplot.               |
| ggplot2         | <code>geom_boxplot()</code> | <code>ggplot(data = iris, aes(x = Species, y = Petal.Length)) + geom_boxplot()</code> | Creates a boxplot when added as a layer to a <code>ggplot()</code> object.  |
| ggplot2         | <code>geom_density()</code> | <code>ggplot(data = iris, aes(x = Petal.Length)) + geom_density()</code>              | Creates a smoothed density plot when added as a layer to a <code>ggplot()</code> object based on the computed density estimate.       |
| ggplot2         | <code>geom_point()</code>   | <code>ggplot(data = iris, aes(x = Species, y = Petal.Length)) + geom_point()</code>   | Creates a scatterplot when added as a layer to a <code>ggplot()</code> object.  |
| ggplot2         | <code>geom_line()</code>    | <code>ggplot(data = iris, aes(x = Species, y = Petal.Length)) + geom_line()</code>    | Creates a line plot when added as a layer to a <code>ggplot()</code> object by connecting the points in order of the x axis variable. |

| Library/Package | Piece of code                | Example of usage   | What it does  |
|-----------------|------------------------------|--|---|
| ggplot2         | geom_hline()                 | ggplot(data = iris,<br>aes(x = Species, y =<br>Petal.Length)) +<br>geom_point() +<br>geom_hline(yintercept =<br>4) | Annotates a plot with<br>horizontal lines when<br>added as a layer to a<br>ggplot() object with<br>one of the geom<br>functions used to draw<br>the plot, for example,<br>geom_point(). |
| ggplot2         | theme_classic()              | ggplot(data = iris,<br>aes(x = Petal.Length))<br>+ geom_density() +<br>theme_classic()                             | Displays ggplot<br>without gridlines. The<br>ggtheme<br>documentation has<br>descriptions on<br>additional themes that<br>can be used.  |
| ggplot2         | xlab(); ylab();<br>ggtitle() | ggplot(data = iris,<br>aes(x = Petal.Length))<br>+ geom_density() +<br>xlab("Petal Length")                        | Modifies the labels on<br>the x axis and on the y<br>axis, and sets the title<br>of a ggplot,<br>respectively.  |
| ggplot2         | facet_wrap()                 | ggplot(data = iris,<br>aes(x = Petal.Length))<br>+ geom_density() +<br>facet_wrap(~Species)                        | Plots individual graphs<br>using specified<br>variables to subset the<br>data.  |
| ggplot2         | ggsave()                     | ggsave(filename =<br>"plotname.pdf")   | Saves the last plot in<br>working directory.  |
| ggplot2         | last_plot()                  | Last plot()  | Returns the last plot<br>produced.  |

[Click here for a summary of the ggplot2 theme system~](#)

## Factors

| Library/Package | Piece of code | Example of usage                                     | What it does  |
|-----------------|---------------|--|---|
| base            | factor()      | fact_qual<br><-factor(c("poor",<br>"fine", "good"))  | Creates a factor out of<br>a vector.                            |
| base            | levels()      | levels(fact_qual)                                    | Shows the levels (and<br>order) of a factor<br>vector.          |
| base            | levels()      | levels(fact_qual) <-<br>c("poor", "fine",<br>"good") | Allows the order of the<br>levels of a factor to be<br>changed. |

| Library/Package      | Piece of code              | Example of usage  | What it does  |
|----------------------|----------------------------|---|---|
| <code>forcats</code> | <code>fct_reorder()</code> | <code>fct_reorder(.f = grade,<br/>.x = absences)</code> | Allows the order of the levels of a factor variable (specified by the <code>.f</code> argument) to be changed according to another variable (specified by the <code>.x</code> argument). In this case grade is ordered by absences. This is especially helpful for plots or statistical output! |

\* This format was adapted from the cheatsheet format from AlexsLemonade.