Drawing graphs

Our data

- To illustrate making graphs, we need some data.
- ▶ Data on 202 male and female athletes at the Australian Institute of Sport.
- Variables:
 - categorical: Sex of athlete, sport they play
 - quantitative: height (cm), weight (kg), lean body mass, red and white blood cell counts, haematocrit and haemoglobin (blood), ferritin concentration, body mass index, percent body fat
- ▶ Values separated by tabs (which impacts reading in).

Packages for this section

library(tidyverse)

Reading data into R

- Use read_tsv ("tab-separated values"), like read_csv.
- ▶ Data in ais.txt:

```
my_url <- "http://ritsokiguess.site/datafiles/ais.txt"
athletes <- read_tsv(my_url)</pre>
```

The data (some)

athletes

```
A tibble: 202 \times 13
  Sex
         Sport
                   RCC
                         WCC
                               Hс
                                     Hg
                                         Ferr
                                                BMI
                                                      SSI
  <chr>
         <chr> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <
                             42.2
 1 female Netball 4.56
                        13.3
                                   13.6
                                           20
                                               19.2
                                                   49
 2 female Netball 4.15
                              38
                                               21.2 110.
                         6
                                   12.7
                                           59
 3 female Netball 4.16
                         7.6
                             37.5
                                   12.3
                                           22
                                               21.4
                                                     89
 4 female Netball 4.32
                         6.4 37.7 12.3
                                           30
                                               21.0
                                                     98.3
 5 female Netball 4.06 5.8 38.7
                                   12.8
                                           78
                                               21.8 122.
 6 female Netball 4.12
                         6.1 36.6
                                   11.8
                                           21
                                               21.4
                                                    90.4
 7 female Netball 4.17
                         5
                             37.4
                                   12.7
                                          109
                                               21.5 107.
 8 female Netball 3.8
                         6.6
                             36.5
                                   12.4
                                          102
                                               24.4 157.
 9 female Netball 3.96
                         5.5 36.3 12.4
                                           71
                                               22.6 101.
10 female Netball 4.44
                         9.7 41.4
                                   14.1
                                           64
                                               22.8 126.
# i 192 more rows
   1 more variable: Wt <dbl>
```

Types of graph

Depends on number and type of variables:

Categorical	Quantitative	Graph
1	0	bar chart
0	1	histogram
2	0	grouped bar charts
1	1	side-by-side boxplots
0	2	scatterplot
2	1	grouped boxplots
1	2	scatterplot with points identified by
		group (eg. by colour)

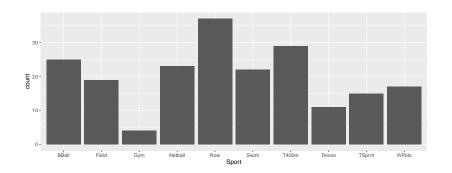
With more (categorical) variables, might want separate plots by groups. This is called facetting in R.

ggplot

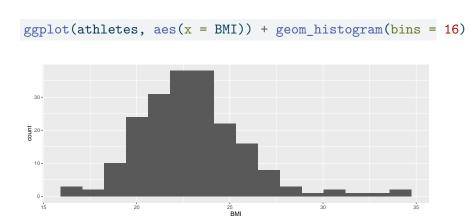
- R has a standard graphing procedure ggplot, that we use for all our graphs.
- Use in different ways to get precise graph we want.
- Let's start with bar chart of the sports played by the athletes.

Bar chart

ggplot(athletes, aes(x = Sport)) + geom_bar()



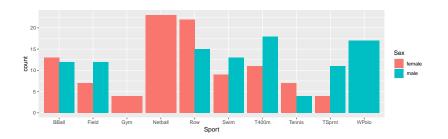
Histogram of body mass index



Which sports are played by males and females?

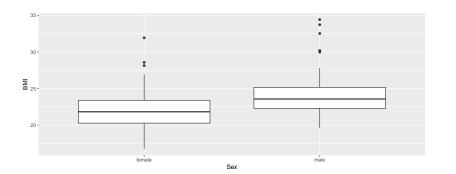
Grouped bar chart:

```
ggplot(athletes, aes(x = Sport, fill = Sex)) +
  geom_bar(position = "dodge")
```



BMI by gender

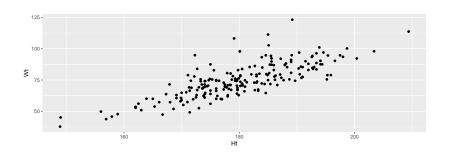
ggplot(athletes, aes(x = Sex, y = BMI)) + geom_boxplot()



Height vs. weight

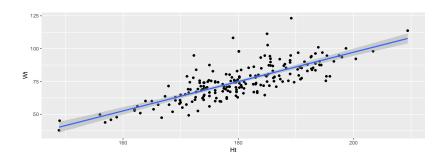
Scatterplot:

```
ggplot(athletes, aes(x = Ht, y = Wt)) + geom_point()
```



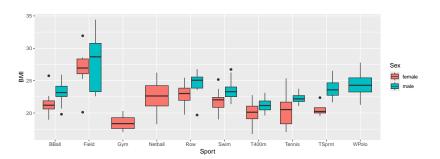
With regression line

```
ggplot(athletes, aes(x = Ht, y = Wt)) +
geom_point() + geom_smooth(method = "lm")
```



BMI by sport and gender

```
ggplot(athletes, aes(x = Sport, y = BMI, fill = Sex)) +
  geom_boxplot()
```



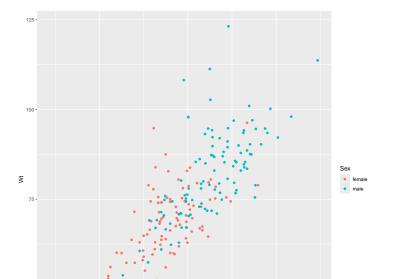
A variation that uses colour instead of fill:

```
ggplot(athletes, aes(x = Sport, y = BMI, colour = Sex)) +
geom_boxplot()
```



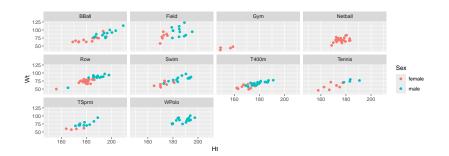
Height and weight by gender

```
ggplot(athletes, aes(x = Ht, y = Wt, colour = Sex)) +
  geom_point()
```



Height by weight by gender for each sport, with facets

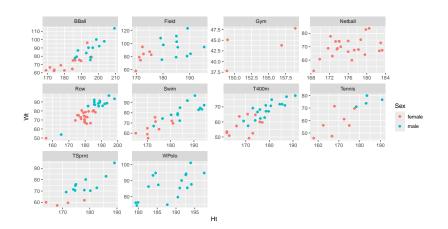
```
ggplot(athletes, aes(x = Ht, y = Wt, colour = Sex)) +
  geom_point() + facet_wrap(~Sport)
```



Filling each facet

Default uses same scale for each facet. To use different scales for each facet, this:

```
ggplot(athletes, aes(x = Ht, y = Wt, colour = Sex)) +
geom_point() + facet_wrap(~Sport, scales = "free")
```



Another view of height vs weight

```
ggplot(athletes, aes(x = Ht, y = Wt)) +
geom_point() + facet_wrap(~ Sex)
```

