Using R (and friends) in maths

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What are we talking about?

- R is a free software programming language
- Very good for handling *data-sets*, making *plots*, *presenting results*, ...
- Easy to learn
- A LOT of packages available
- Nice IDE and editor: RStudio

Quick examples

```
x <- 1:6 # range of integers
y <- c(1,2)
x^2
```

```
## [1]  1  4  9 16 25 36
```

```
sin(x)
```

```
## [1]  0.8415  0.9093  0.1411 -0.7568 -0.9589 -0.2794
```

```
x+y
```

```
## [1] 2 4 4 6 6 8
```

Did you say plots?

```
library(ggplot2)
qplot(speed, dist, data = cars) + geom_smooth()
```

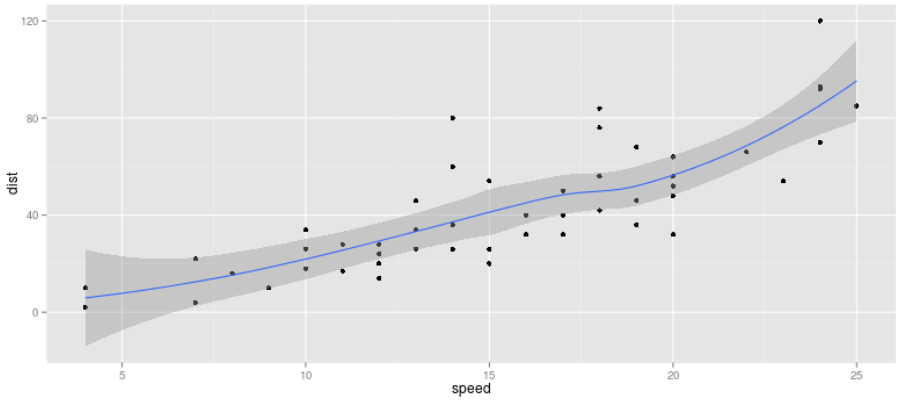


Figure 1: A scatterplot of `cars`

Arc diagrams

We can draw arc diagrams for RNA secondary structure, defining them as parenthesized strings (e.g. ((..().)))

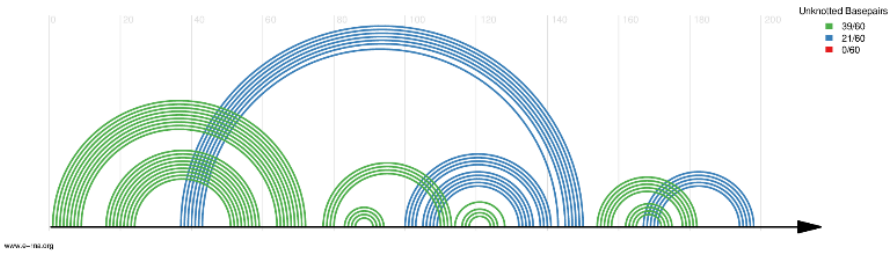


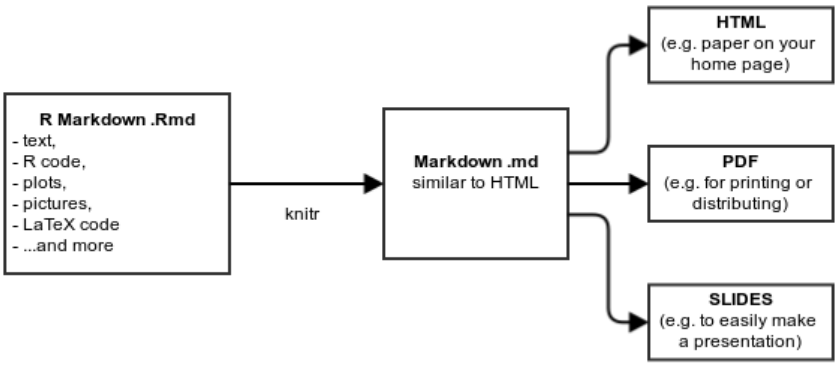
Figure 2: Arc diagram

Presenting data and results: R Markdown

- It's a plain text formatting syntax, like a simplified HTML.
- Easier than LaTeX. Far fewer commands to remember, e.g. to write bullet points, just begin with a dash "`-`" instead of `\begin{itemize}` and `\item`;
- It can include LaTeX code e.g. $f(k) = \binom{n}{k} p^k (1-p)^{n-k}$

- It can include R code which gets executed when transforming the R Markdown into HTML/PDF/slides. (using `knitr`). It takes one click.

Example workflow



Example: this presentation

- This presentation was written in R Markdown.
- Let's peek at the source code.

Example outputs

I can transform my presentation in different formats using knitr, pandoc and other commands - HTML - PDF

Eye-candy

A different kind of plot: pollution in the US (Source: Kamal, Exploratory Data Analysis Coursera class, May 2014)