Using RMarkdown for reproducible and neat documents

Your name here
Your affiliation here

Contents

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Overview

This document showcases how to create and use `RMarkdown` documents.

You can easily create headings. This is a first order heading.

Then move down in heading order size

Like this subheading

And this fourth order heading

You can write in **bold** and *italicised* text (in **two** different *ways*).

You can write in-line `code` if you want to differentiate between when you are typing normally or highlighting `model parameters`, for example.

Equations like this $t' = \gamma(t - vx/c^2)$, to appear within text lines.

Create links to your website.

Make footnotes[1].

Insert line breaks between text like this, which works best in large slabs of text

Insert a horizontal line break using five asterisks ('*****')

The raw Rmd file also has the code for inserting user comments.

(There is also a page break here. Best seen in PDF. Check the raw Rmd file to see the code)

---

[1] Here is the footnote you created earlier, automatically formatted

Define equations

Accordingly, we write the eigenfunction of a spinless particle as the superposition of plane wave states of momentum (π) and energy (E_j) having amplitudes $a(\pi, E_j)$ (from [1]).

$$\phi n(r,t) = \sum_{i,j} a(p_i, E_j) e^{\frac{i}{\hbar}(p_i \cdot r - E_j t)}$$
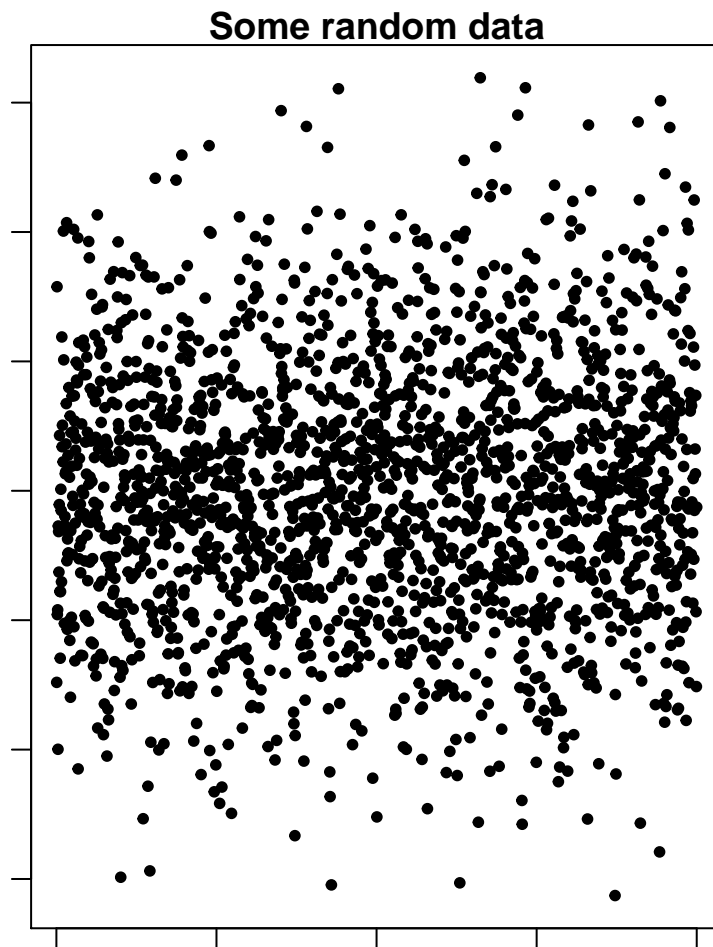
Create, alter, and embed plots

Some random data

Figure 1. Example of a stock plot embedded into a PDF from RMarkdown.

Show plots with associated code

```
suppressWarnings(require(viridis))
bm <- 1
par(las = 1, bty = "n")
xlim <- c(-5, 5)
ylim <- c(0, 0.5)
set.seed(12)
N <- 2000
rr <- rnorm(N)
rr2 <- rnorm(N^2)
rr3 <- rnorm(N + 0.3)
rrd <- density(rr)
rrd2 <- density(rr2)
rrd3 <- density(rr3)
main <- paste0(N, " points but plot better")
xlab <- "Points in space"
if (bm == 1) {
    layout(matrix(c(rep(1,
        3), 2:4), 2, 3, byrow = TRUE))
    sc <- 1
    plot(rr, las = 1, bty = "n",
        col = adjustcolor(viridis(N),
            0.5), pch = 20,
        cex = runif(10, 1,
            5), main = main,
        xlab = xlab)
    for (r in list(rrd, rrd2,
        rrd3)) {
        plot(r, xlim = xlim,
            ylim = ylim, main = "")
        polygon(r, col = adjustcolor(viridis(250)[sc],
            0.5), border = viridis(250)[sc])
        sc <- sc + 100
    }
} else {
    par(mfrow = c(1, 1))
    plot(rr, las = 1, bty = "n",
        col = adjustcolor(viridis(N),
            0.5), pch = 20,
        cex = runif(10, 1,
            5), main = main,
        xlab = xlab)
}
```

2000 points but plot better

Points in space
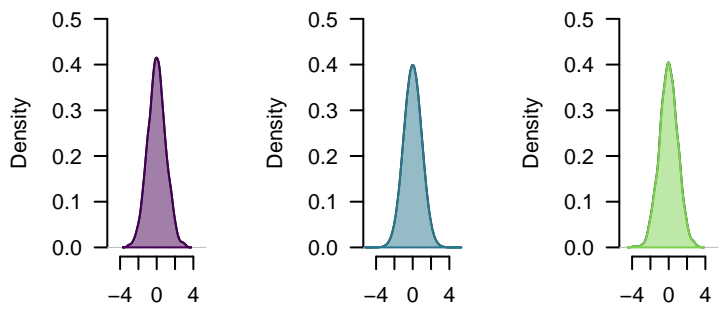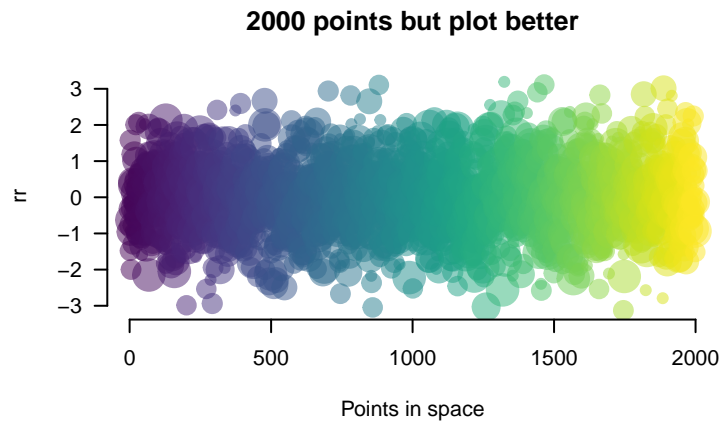
Figure 2. Example of a plot with improved graphics and its associated code embedded into the output document from RMarkdown.

And tables

Table 1. Definitions of model parameters for individual hosts and **parasites**. Dimensions and units: -, dimensionless; cm, centimetres; J, Joules; L, length.

Parameter	Definition	Dimension(unit)
L	structural length	cm
ee	scaled reserve density	J (cm^3)
D	host development	—
RH	energy in reproduction buffer	J

Use buttons or tabs for sub-chapters
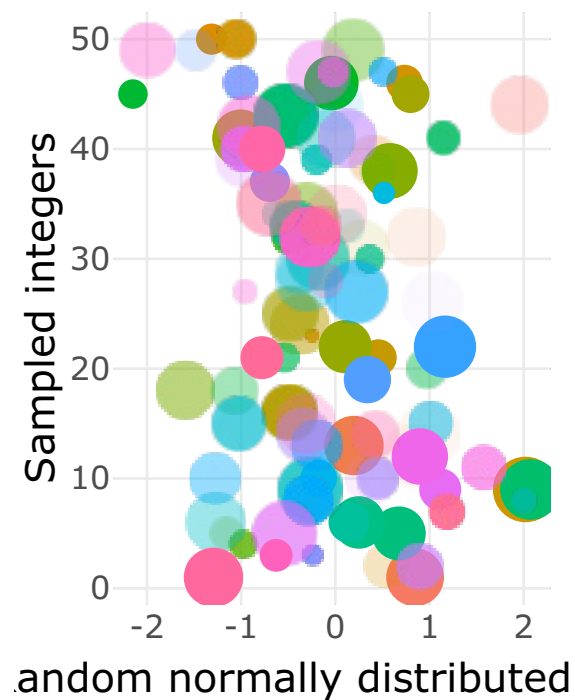
Chapter 1

. . . . .

Then you can add whatever you want here like you would normally write in the `Rmd` file.

. . . . .

Chapter 2 (with new code)

Here's an Easter egg for you . . .

More tables

Here's a new way of creating tables using the `DT` package

Search: [   ]

Table 1. The 'mtcars' dataset presented in a datatable. Try editing the columns and cells.

	mpg ⬍	cyl ⬍	disp ⬍	hp ⬍	drat ⬍	wt ⬍	qsec ⬍	vs ⬍	am ⬍	gear ⬍	carb ⬍
	All	All	All	All	All	All	All	All	All	All	All
Mazda RX4	21	6	160	110	3.9	2.62	16.46	0	1	4	4
Mazda RX4 Wag	21	6	160	110	3.9	2.875	17.02	0	1	4	4
Datsun 710	22.8	4	108	93	3.85	2.32	18.61	1	1	4	1
Hornet 4 Drive	21.4	6	258	110	3.08	3.215	19.44	1	0	3	1
Hornet Sportabout	18.7	8	360	175	3.15	3.44	17.02	0	0	3	2

Showing 1 to 5 of 32 entries   Previous [1] 2 3 4 5 6 7 Next

Embed code from different languages

This is R code

```r
pck <- 0
if (pck == 1) {
    p <- c("rJava", "RNetLogo")
    remove.packages(p)
    # then install rJava and
    # RNetLogo from source
    install.packages("rJava",
        repos = "https://cran.r-project.org/")
    install.packages("RNetLogo",
        repos = "https://cran.r-project.org/")
}
```

shell/bash

```bash
echo "Hello Bash!"
pwd # check working dir
git init # initialise git
```

Octave (and MATLAB from the RMatlab package).

RMatlab documentation.

```
b = [4; 9; 2] # Column vector
A = [ 3 4 5;
      1 3 1;
      3 5 9 ]
x = A \ b      # Solve the system Ax = b
```

HTML

```
<!-- links-->
      <div class="footer">
          <a href="dd_feed.html"
          class="transition fade_in">
              Latest post
          </a>
               
          <a href="dd_contact.html"
          class="transition fade_in">
              Contact
          </a>
               
          <a href="dd_subscribe.html"
          class="transition fade_in">
              Subscribe
          </a>
      </div>
```

CSS

```
# custom code for the tabs in this file
.btn {
    border-width: 0 0px 0px 0px;
    font-weight: normal;
    text-transform: ;
}
.btn-default {
    color: #f08080;
    background-color: #ffffff;
    border-color: #ffffff;
}
```

Javascript to access `html` and `css`

```javascript
$('.title').css('color', 'red')
```

Python

```python
x = 'hello, python world!'
print(x.split(' '))
```

Here's a complete list of available languages

```r
names(knitr::knit_engines$get())
```

```
##  [1] "awk"
##  [2] "bash"
##  [3] "coffee"
##  [4] "gawk"
##  [5] "groovy"
##  [6] "haskell"
##  [7] "lein"
##  [8] "mysql"
##  [9] "node"
## [10] "octave"
## [11] "perl"
## [12] "psql"
## [13] "Rscript"
## [14] "ruby"
## [15] "sas"
## [16] "scala"
## [17] "sed"
## [18] "sh"
## [19] "stata"
## [20] "zsh"
## [21] "highlight"
## [22] "Rcpp"
## [23] "tikz"
## [24] "dot"
## [25] "c"
## [26] "cc"
## [27] "fortran"
```

```
## [28] "fortran95"
## [29] "asy"
## [30] "cat"
## [31] "asis"
## [32] "stan"
## [33] "block"
## [34] "block2"
## [35] "js"
## [36] "css"
## [37] "sql"
## [38] "go"
## [39] "python"
## [40] "julia"
## [41] "sass"
## [42] "scss"
## [43] "R"
## [44] "bslib"
## [45] "targets"
```

References

[1] Efthimiades, S., Physical meaning and derivation of Schrodinger and Dirac equations, Department of Natural Sciences, Fordham University, doi: d34464566.