

# Using RMarkdown for reproducible and neat documents

Your name here  
Your affiliation here

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Date: !r Sys.Date()  
R version: !r getRversion()  
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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<sup>1</sup>.

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)

---

<sup>1</sup>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 ( $\pi$ ) 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

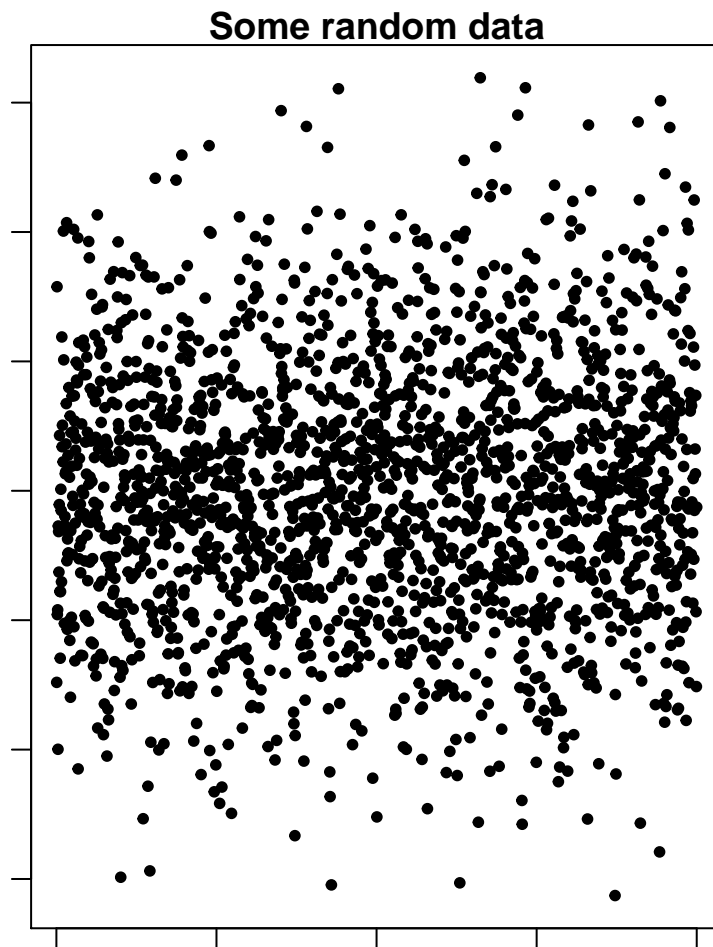
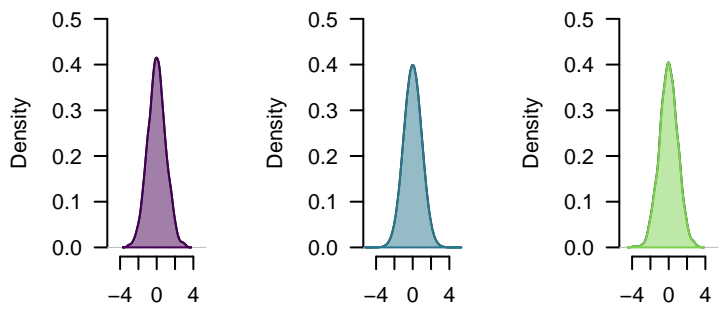
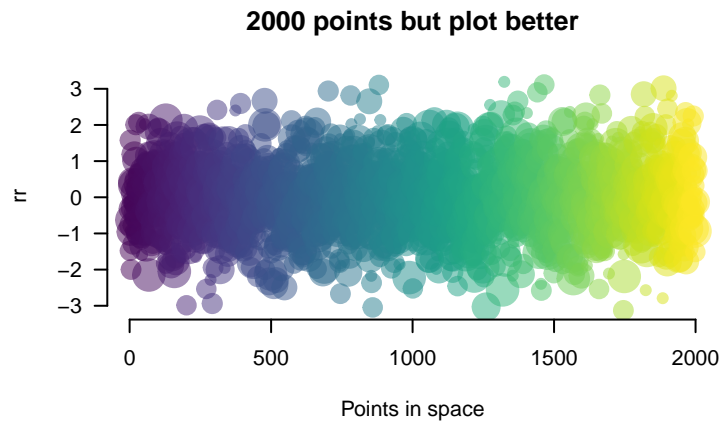


Figure 1. Example of a stock plot embedded into a PDF from RMarkdown.

## 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)}
```



`N = 2000 Bandwidth = 0.1 = 4000000 Bandwidth = 0 N = 2000 Bandwidth = 0.1`

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 <sup>3</sup> ) |
| $D$       | host development              | —                    |
| $RH$      | energy in reproduction buffer | J                    |

## Use buttons or tabs for sub-chapters

### Chapter 1

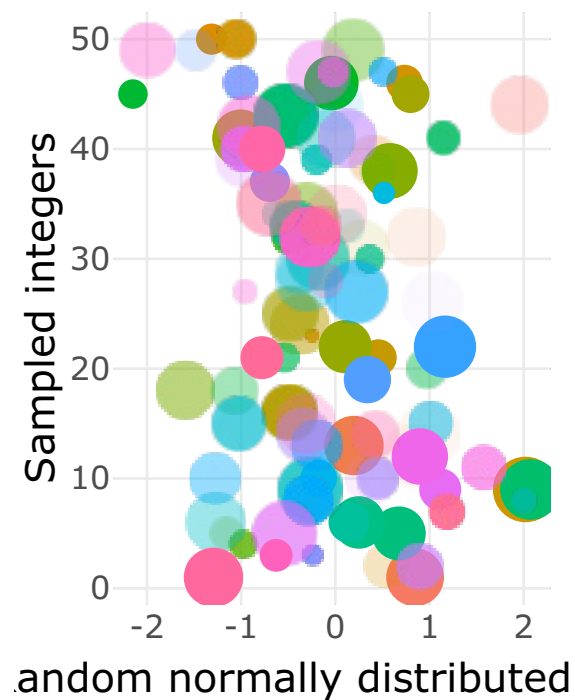
.....

*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

Show  entries Search:

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

|                   | mpg                              | cyl                              | dis                              | hp                               | drat                             | wt                               | qsec                             | vs                               | am                               | gear                             | carb                             |
|-------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
|                   | <input type="text" value="All"/> | <input type="text" value="All"/> | <input type="text" value="All"/> | <input type="text" value="All"/> | <input type="text" value="All"/> | <input type="text" value="All"/> | <input type="text" value="All"/> | <input type="text" value="All"/> | <input type="text" value="All"/> | <input type="text" value="All"/> | <input type="text" value="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  2 3 4 5 6 7 Next

## Embed code from different languages

This is R code

```
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

```
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>
        &nbsp; &nbsp; &nbsp; &nbsp;
        <a href="dd_contact.html"
            class="transition fade_in">
            Contact
        </a>
        &nbsp; &nbsp; &nbsp; &nbsp;
        <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

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

## Python

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

Here's a complete list of available languages

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

```
## [1] "awk"      "bash"      "coffee"    "gawk"      "groovy"    "haskell"   "lein"
## [9] "node"     "octave"    "perl"      "psql"      "Rscript"   "ruby"      "sas"
## [17] "sed"      "sh"        "stata"     "zsh"       "highlight" "Rcpp"      "tikz"
## [25] "c"        "fortran"   "fortran95" "asy"       "cat"       "asis"      "stan"
## [33] "block2"   "js"        "css"       "sql"       "go"        "python"    "julia"
## [41] "scss"
```

## References

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