EPPS6356: Data Visualization
Assignment 1

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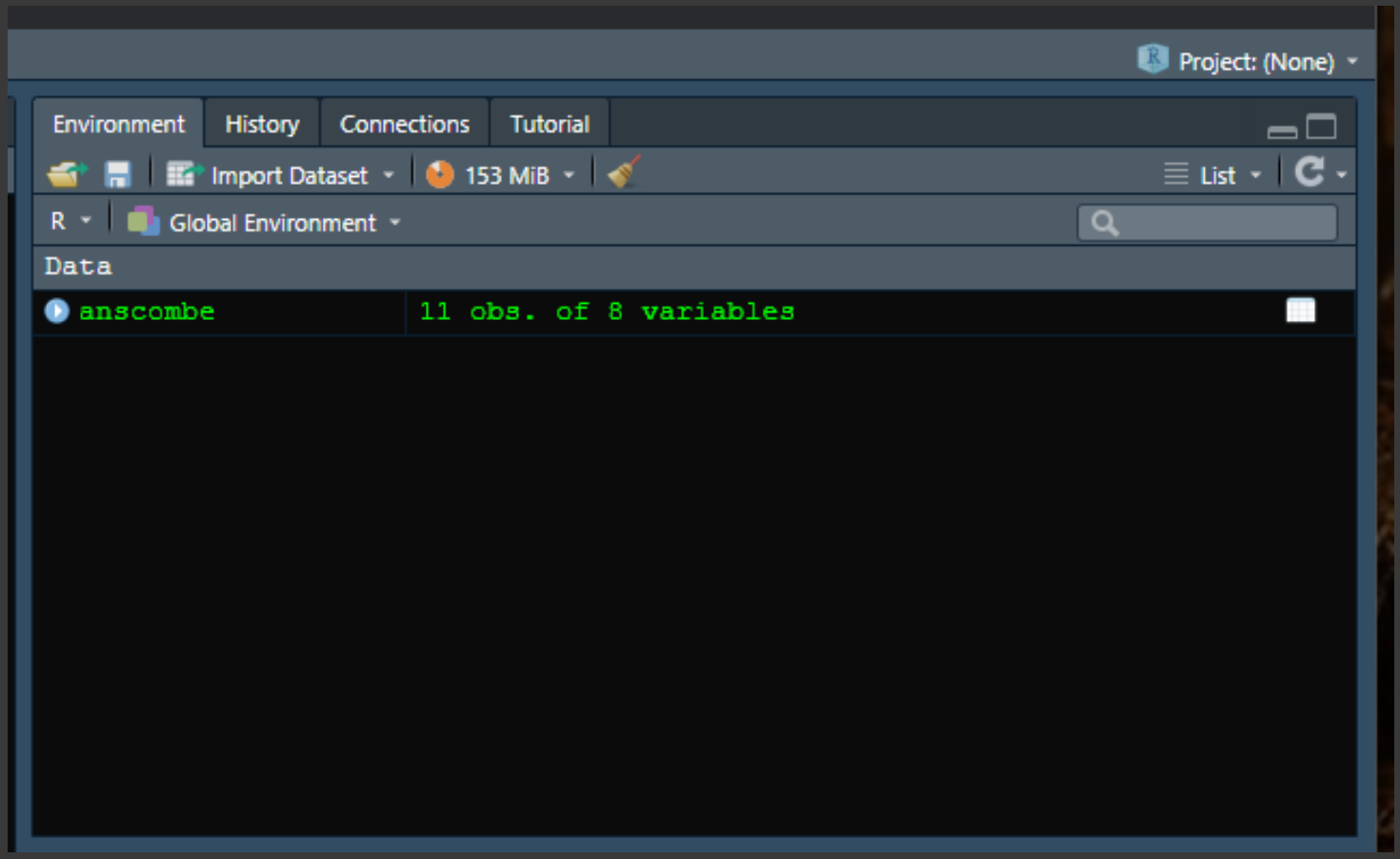
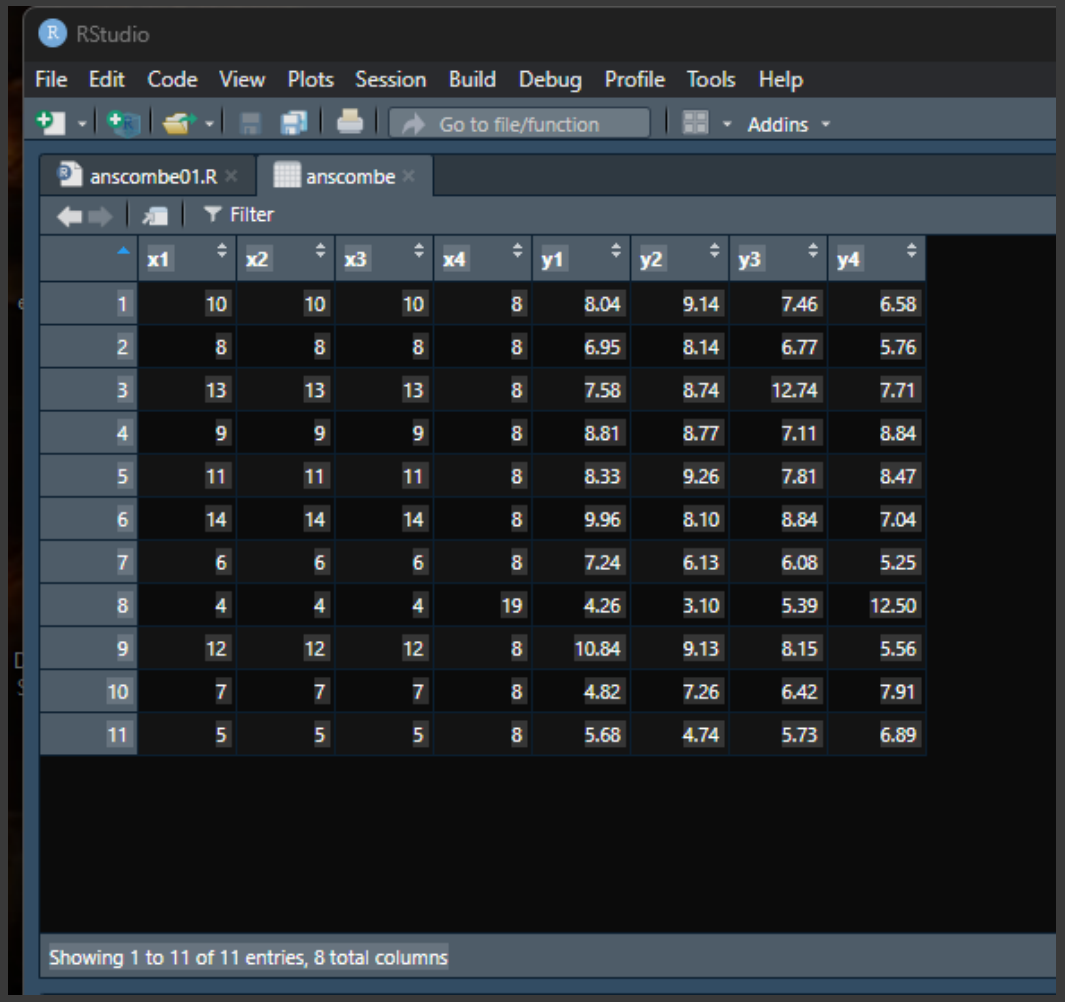
8 September 2024

1. Anscombe01.R

```
> data(anscombe)  # Load Anscombe's data
```



```
> View(anscombe) # View the data
```

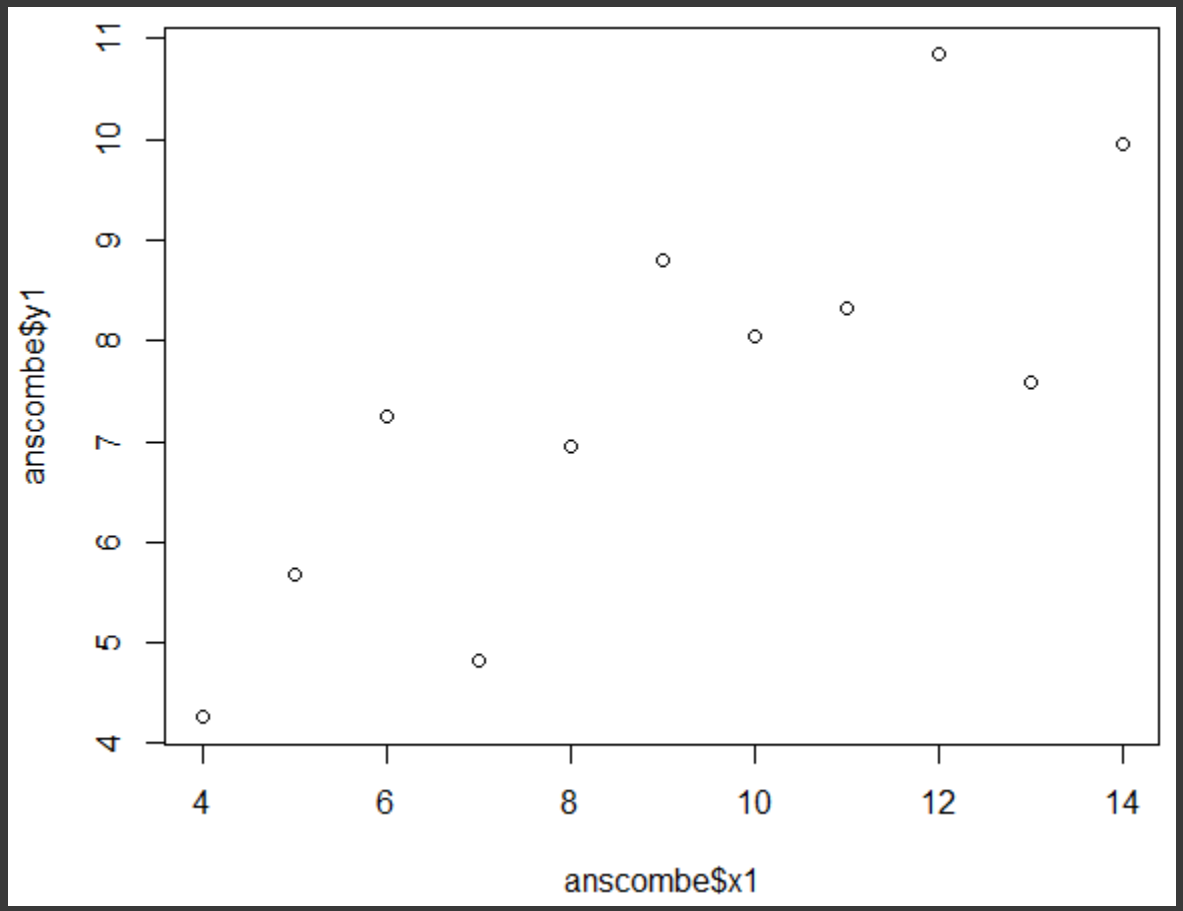


	x1	x2	x3	x4	y1	y2	y3	y4
1	10	10	10	8	8.04	9.14	7.46	6.58
2	8	8	8	8	6.95	8.14	6.77	5.76
3	13	13	13	8	7.58	8.74	12.74	7.71
4	9	9	9	8	8.81	8.77	7.11	8.84
5	11	11	11	8	8.33	9.26	7.81	8.47
6	14	14	14	8	9.96	8.10	8.84	7.04
7	6	6	6	8	7.24	6.13	6.08	5.25
8	4	4	4	19	4.26	3.10	5.39	12.50
9	12	12	12	8	10.84	9.13	8.15	5.56
10	7	7	7	8	4.82	7.26	6.42	7.91
11	5	5	5	8	5.68	4.74	5.73	6.89

```
> summary(anscombe)
```

x1	x2	x3	x4	y1	y2	y3	y4
Min. : 4.0	Min. : 4.0	Min. : 4.0	Min. : 8	Min. : 4.260	Min. :3.100	Min. : 5.39	Min. : 5.250
1st Qu.: 6.5	1st Qu.: 6.5	1st Qu.: 6.5	1st Qu.: 8	1st Qu.: 6.315	1st Qu.:6.695	1st Qu.: 6.25	1st Qu.: 6.170
Median : 9.0	Median : 9.0	Median : 9.0	Median : 8	Median : 7.580	Median :8.140	Median : 7.11	Median : 7.040
Mean : 9.0	Mean : 9.0	Mean : 9.0	Mean : 9	Mean : 7.501	Mean :7.501	Mean : 7.50	Mean : 7.501
3rd Qu.:11.5	3rd Qu.:11.5	3rd Qu.:11.5	3rd Qu.: 8	3rd Qu.: 8.570	3rd Qu.:8.950	3rd Qu.: 7.98	3rd Qu.: 8.190
Max. :14.0	Max. :14.0	Max. :14.0	Max. :19	Max. :10.840	Max. :9.260	Max. :12.74	Max. :12.500

```
> ## Simple version
> plot(anscombe$x1,anscombe$y1)
```

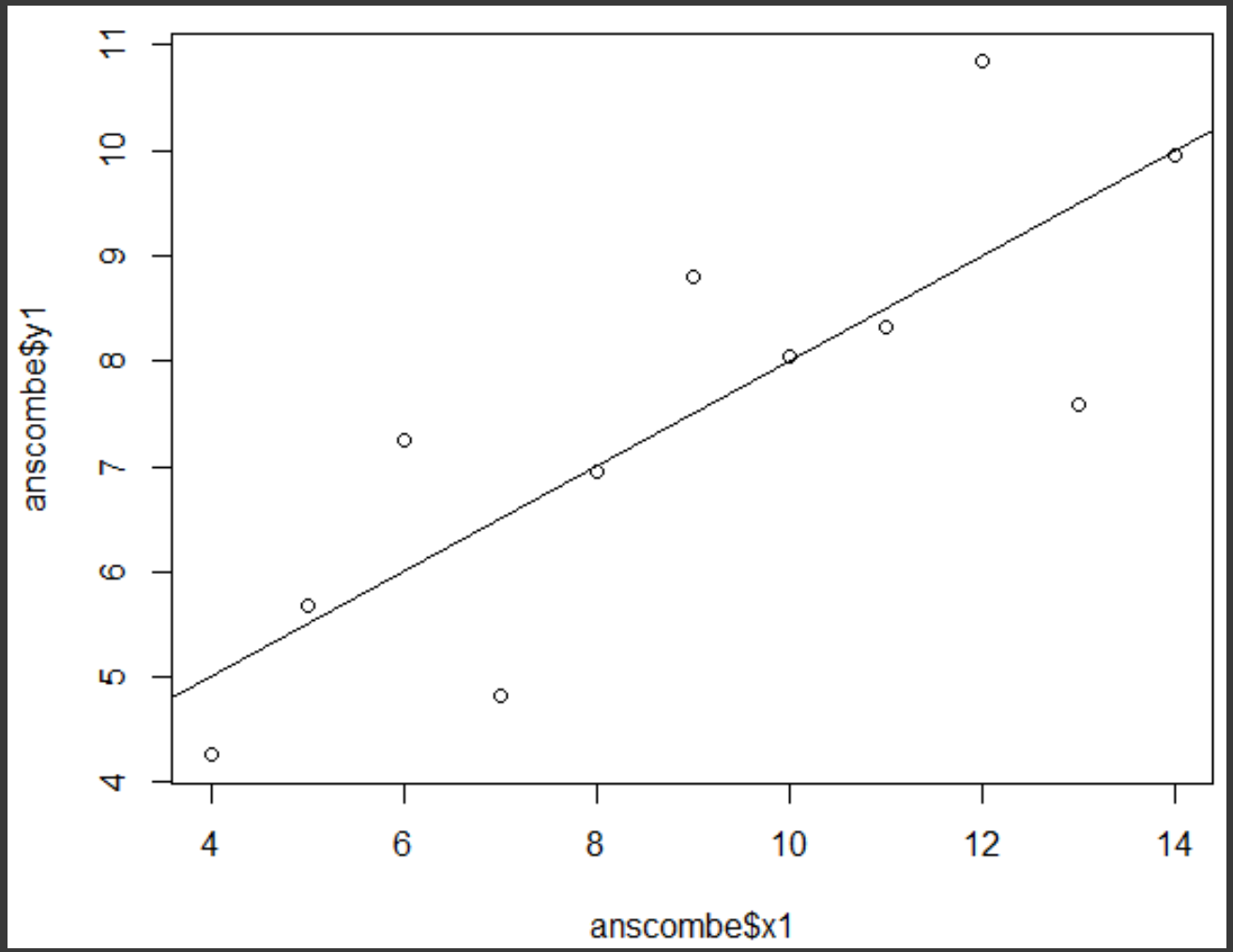


```
> summary(anscombe)

       x1             x2             x3             x4           y1              y2              y3              y4        
 Min.   : 4.0   Min.   : 4.0   Min.   : 4.0   Min.   : 8   Min.   : 4.260   Min.   :3.100   Min.   : 5.39   Min.   : 5.250  
 1st Qu.: 6.5   1st Qu.: 6.5   1st Qu.: 6.5   1st Qu.: 8   1st Qu.: 6.315   1st Qu.:6.695   1st Qu.: 6.25   1st Qu.: 6.170  
 Median : 9.0   Median : 9.0   Median : 9.0   Median : 8   Median : 7.580   Median :8.140   Median : 7.11   Median : 7.040  
 Mean   : 9.0   Mean   : 9.0   Mean   : 9.0   Mean   : 9   Mean   : 7.501   Mean   :7.501   Mean   : 7.50   Mean   : 7.501  
 3rd Qu.:11.5   3rd Qu.:11.5   3rd Qu.:11.5   3rd Qu.: 8   3rd Qu.: 8.570   3rd Qu.:8.950   3rd Qu.: 7.98   3rd Qu.: 8.190  
 Max.   :14.0   Max.   :14.0   Max.   :14.0   Max.   :19   Max.   :10.840   Max.   :9.260   Max.   :12.74   Max.   :12.500  

> # Create four model objects
> lm1 <- lm(y1 ~ x1, data=anscombe)
> summary(lm1)

Call:
lm(formula = y1 ~ x1, data = anscombe)

Residuals:
     Min       1Q   Median       3Q      Max 
-1.92127 -0.45577 -0.04136  0.70941  1.83882 

Coefficients:
            Estimate Std. Error t value Pr(>|t|)   
(Intercept)   3.0001     1.1247   2.667  0.02573 * 
x1            0.5001     0.1179   4.241  0.00217 **
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 1.237 on 9 degrees of freedom
Multiple R-squared:  0.6665,  Adjusted R-squared:  0.6295 
F-statistic: 17.99 on 1 and 9 DF,  p-value: 0.00217
```

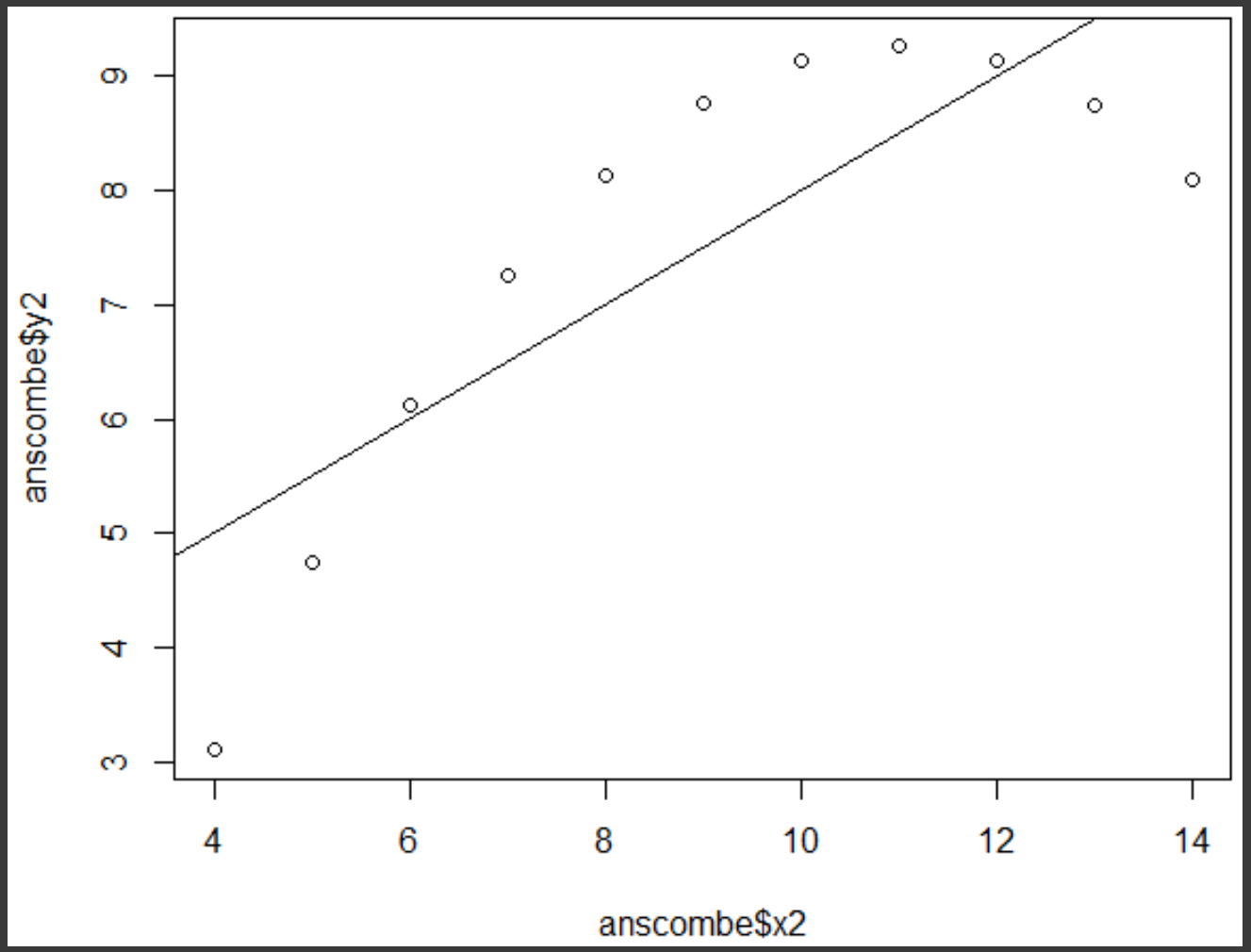
```
> lm2 <- lm(y2 ~ x2, data=anscombe)
> summary(lm2)

Call:
lm(formula = y2 ~ x2, data = anscombe)

Residuals:
    Min      1Q  Median      3Q     Max
-1.9009 -0.7609  0.1291  0.9491  1.2691

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)    3.001      1.125   2.667  0.02576 *
x2             0.500      0.118   4.239  0.00218 **
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 1.237 on 9 degrees of freedom
Multiple R-squared:  0.6662,  Adjusted R-squared:  0.6292
F-statistic: 17.97 on 1 and 9 DF,  p-value: 0.002179




> lm3 <- lm(y3 ~ x3, data=anscombe)
> summary(lm3)

Call:
lm(formula = y3 ~ x3, data = anscombe)

Residuals:
    Min      1Q  Median      3Q     Max
-1.1586 -0.6146 -0.2303  0.1540  3.2411

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)   3.0025     1.1245   2.670  0.02562 *
x3            0.4997     0.1179   4.239  0.00218 **
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 1.236 on 9 degrees of freedom
Multiple R-squared:  0.6663,  Adjusted R-squared:  0.6292
F-statistic: 17.97 on 1 and 9 DF,  p-value: 0.002176
```

```
> lm4 <- lm(y4 ~ x4, data=anscombe)
> summary(lm4)

Call:
lm(formula = y4 ~ x4, data = anscombe)

Residuals:
   Min     1Q Median     3Q    Max
-1.751 -0.831  0.000  0.809  1.839

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)   3.0017     1.1239   2.671  0.02559 *
x4            0.4999     0.1178   4.243  0.00216 **
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 1.236 on 9 degrees of freedom
Multiple R-squared:  0.6667,  Adjusted R-squared:  0.6297
F-statistic:    18 on 1 and 9 DF,  p-value: 0.002165
```

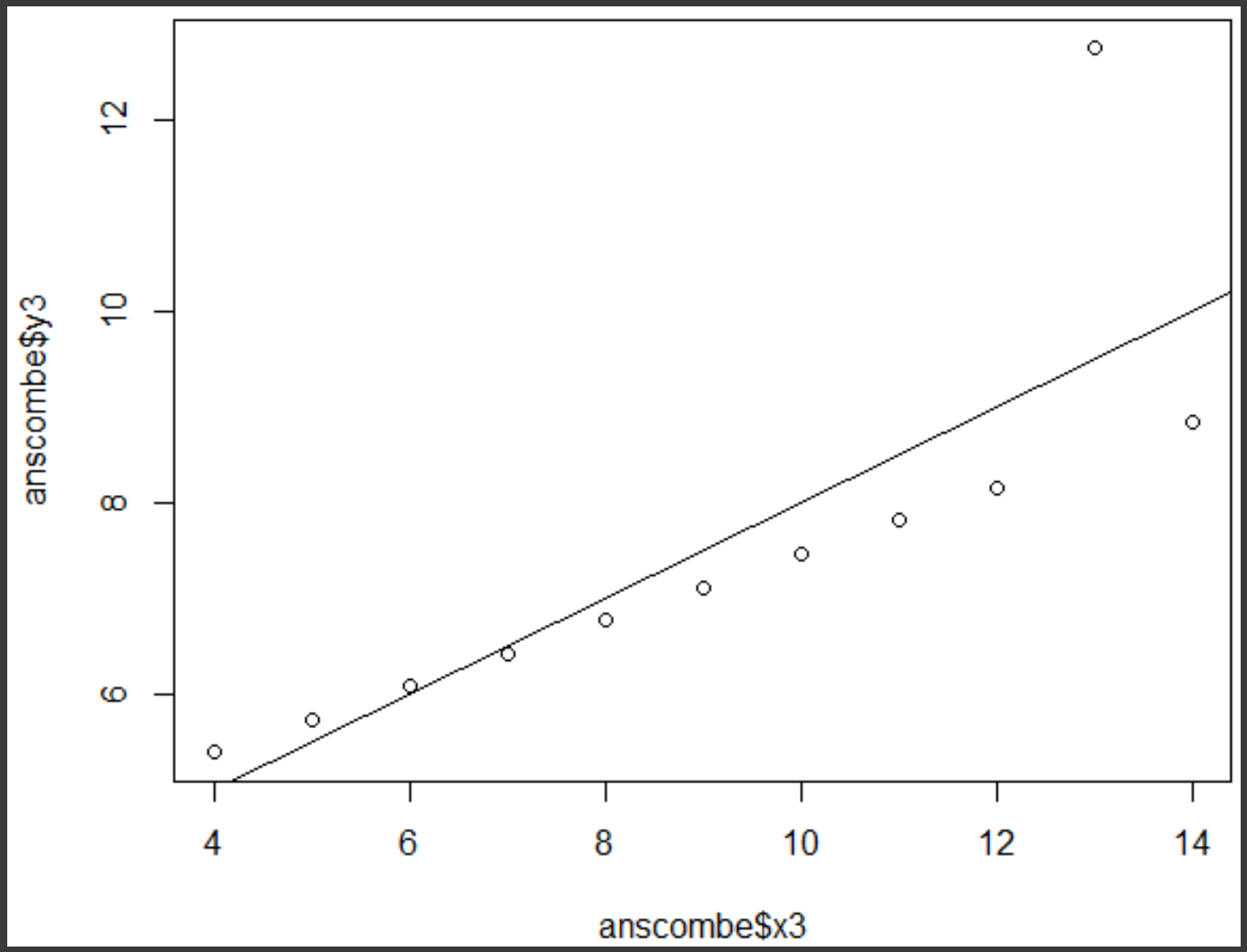
```
> plot(anscombe$x1,anscombe$y1)
> abline(coefficients(lm1))
```



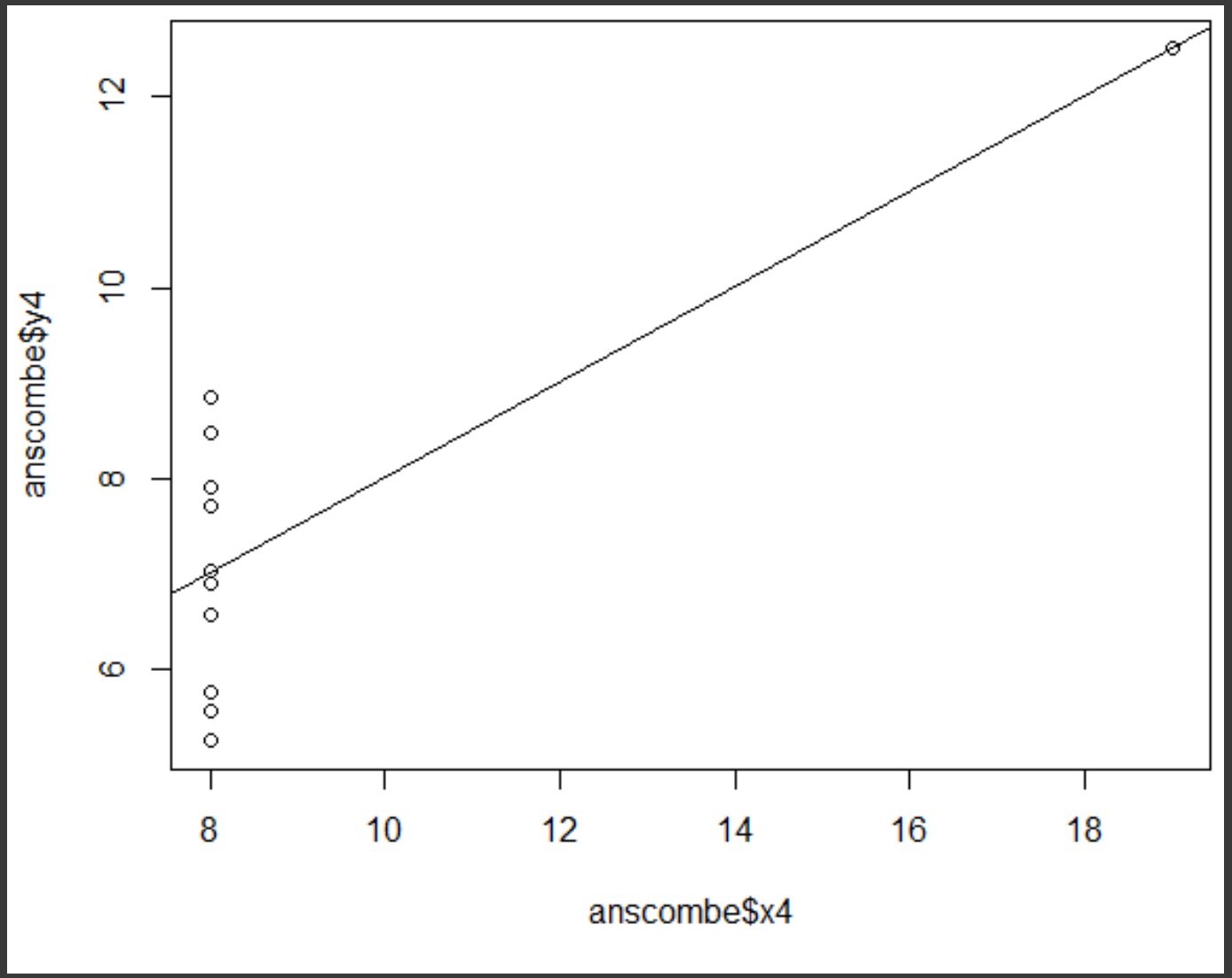
```
> plot(anscombe$x2,anscombe$y2)
> abline(coefficients(lm2))
```



```
> plot(anscombe$x3,anscombe$y3)
> abline(coefficients(lm3))
```



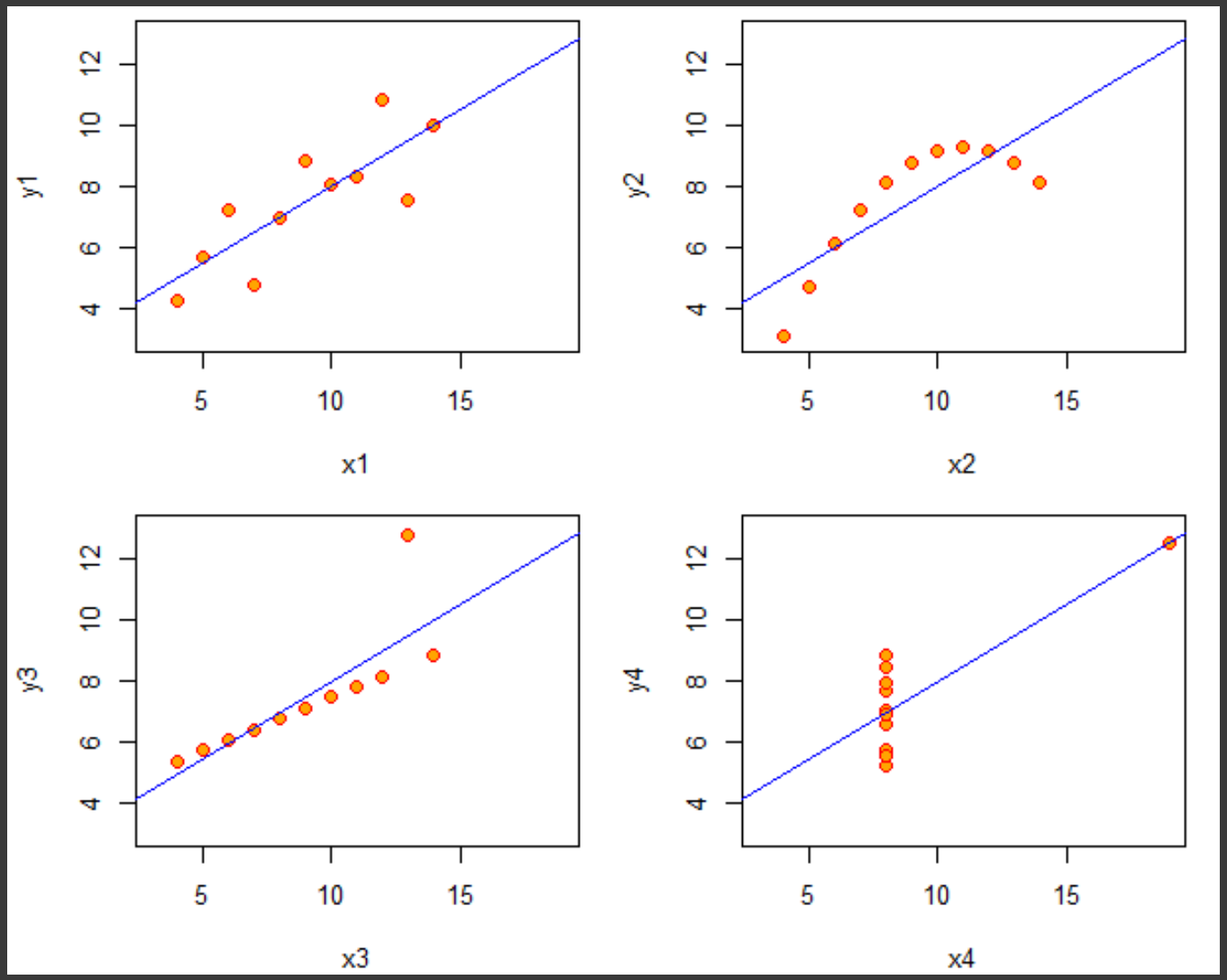
```
> plot(anscombe$x4,anscombe$y4)
> abline(coefficients(lm4))
```



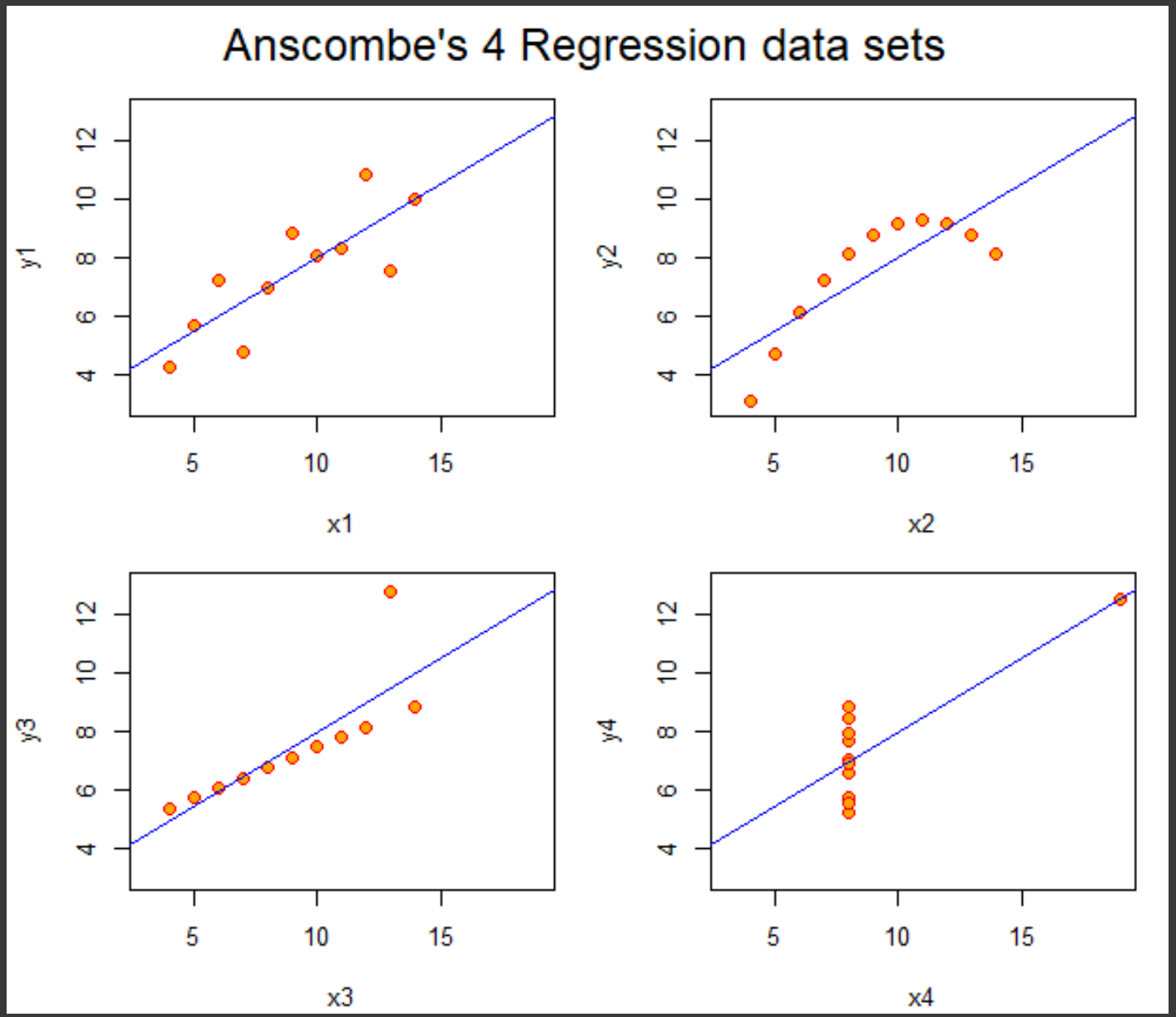
```
> ff <- y ~ x
> mods <- setNames(as.list(1:4), paste0("lm", 1:4))
> # Plot using for loop
> for(i in 1:4) {
+   ff[2:3] <- lapply(paste0(c("y","x"), i), as.name)
+   ## or   ff[[2]] <- as.name(paste0("y", i))
+   ##      ff[[3]] <- as.name(paste0("x", i))
+   mods[[i]] <- lmi <- lm(ff, data = anscombe)
+   print(anova(lmi))
+ }
Analysis of Variance Table

Response: y1
          Df Sum Sq Mean Sq F value  Pr(>F)
x1         1 27.510 27.5100   17.99 0.00217 **
Residuals  9 13.763  1.5292
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
Analysis of Variance Table

Response: y2
          Df Sum Sq Mean Sq F value   Pr(>F)
x2         1 27.500 27.5000  17.966 0.002179 **
Residuals  9 13.776  1.5307
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
Analysis of Variance Table

Response: y3
          Df Sum Sq Mean Sq F value   Pr(>F)
x3         1 27.470 27.4700  17.972 0.002176 **
Residuals  9 13.756  1.5285
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
Analysis of Variance Table

Response: y4
          Df Sum Sq Mean Sq F value   Pr(>F)
x4         1 27.490 27.4900  18.003 0.002165 **
Residuals  9 13.742  1.5269
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

```
> sapply(mods, coef)  # Note the use of this function
                lm1      lm2       lm3       lm4
(Intercept) 3.0000909 3.000909 3.0024545 3.0017273
x1          0.5000909 0.500000 0.4997273 0.4999091
> lapply(mods, function(fm) coef(summary(fm)))
$lm1
             Estimate Std. Error  t value    Pr(>|t|)
(Intercept) 3.0000909  1.1247468 2.667348 0.025734051
x1          0.5000909  0.1179055 4.241455 0.002169629

$lm2
            Estimate Std. Error  t value    Pr(>|t|)
(Intercept) 3.000909  1.1253024 2.666758 0.025758941
x2          0.500000  0.1179637 4.238590 0.002178816

$lm3
             Estimate Std. Error  t value    Pr(>|t|)
(Intercept) 3.0024545  1.1244812 2.670080 0.025619109
x3          0.4997273  0.1178777 4.239372 0.002176305

$lm4
             Estimate Std. Error  t value    Pr(>|t|)
(Intercept) 3.0017273  1.1239211 2.670763 0.025590425
x4          0.4999091  0.1178189 4.243028 0.002164602
```

```
> # Preparing for the plots
> op <- par(mfrow = c(2, 2), mar = 0.1+c(4,4,1,1), oma =  c(0, 0, 2, 0))
> # Plot charts using for loop
> for(i in 1:4) {
+   ff[2:3] <- lapply(paste0(c("y","x"), i), as.name)
+   plot(ff, data = anscombe, col = "red", pch = 21, bg = "orange", cex = 1.2,
+        xlim = c(3, 19), ylim = c(3, 13))
+   abline(mods[[i]], col = "blue")
+ }
```



```
> mtext("Anscombe's 4 Regression data sets", outer = TRUE, cex = 1.5)
> par(op)
```

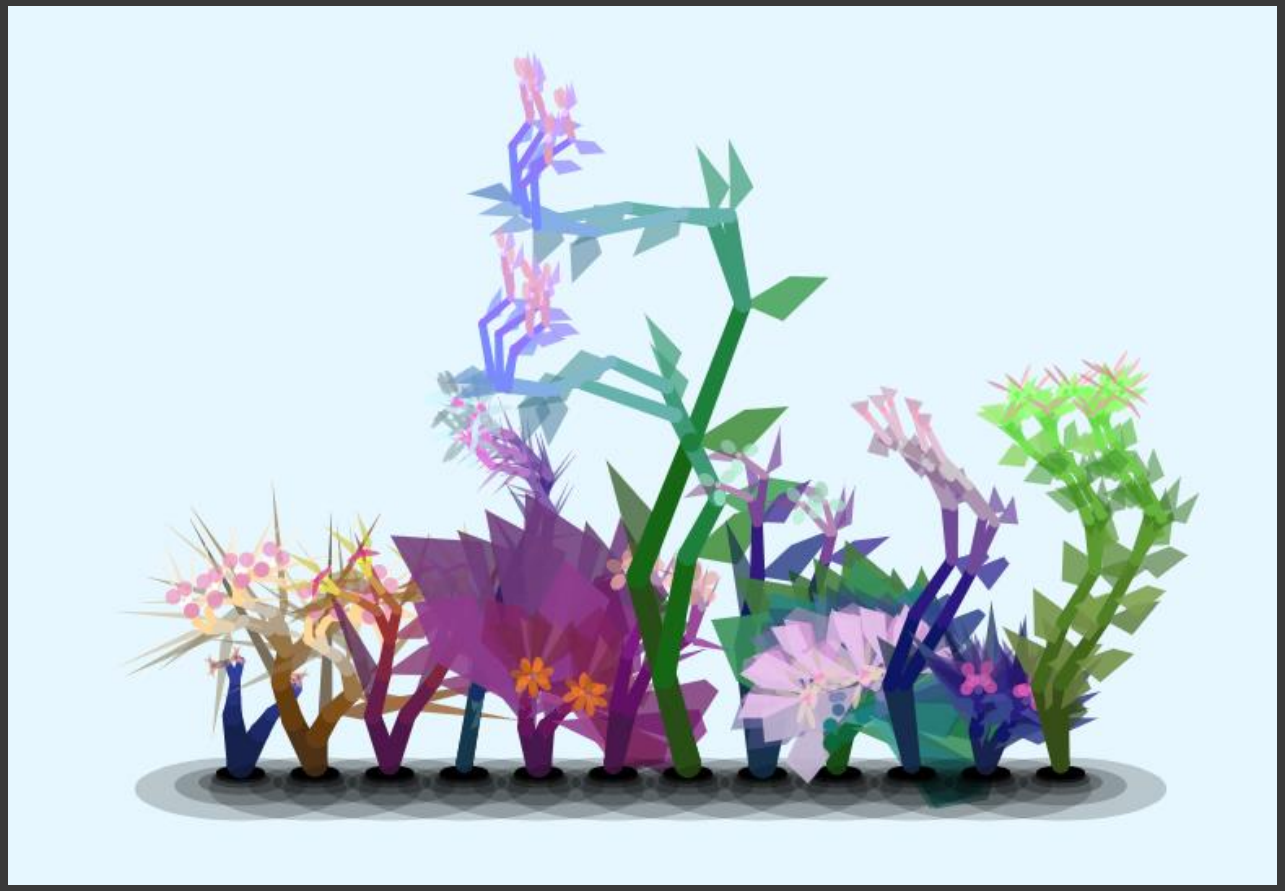


2. Google "generative art". Cite some examples.

Spittel, A, & Reichard, J. (2018). An introduction to Generative Art: what it is, and how you make it. freeCodeCamp. https://www.freecodecamp.org/news/an-introduction-to-generative-art-what-it-is-and-how-you-make-it-b0b363b50a70/

Examples of Generative Art (as offered by this online article)

Kate Compton's Flowers:



Cellular Automata and the Edge of Chaos

1D Cellular Automata and the Edge Of Chaos

(Click here for info and instructions.)

Run | Pause | Step

Run to Next Screen

Restart Current World

Run Speed: Faster

Create New World Using:

Fill: All Cells, 50% dead

Cell Size: 2

Edit Colors

Create New Rule Set Using:

Number of States: 4

Neighborhood Size: 5

Isotropic

Save Example in Browser

Name: example 1

Load Example:

(None Available)

Delete Example:

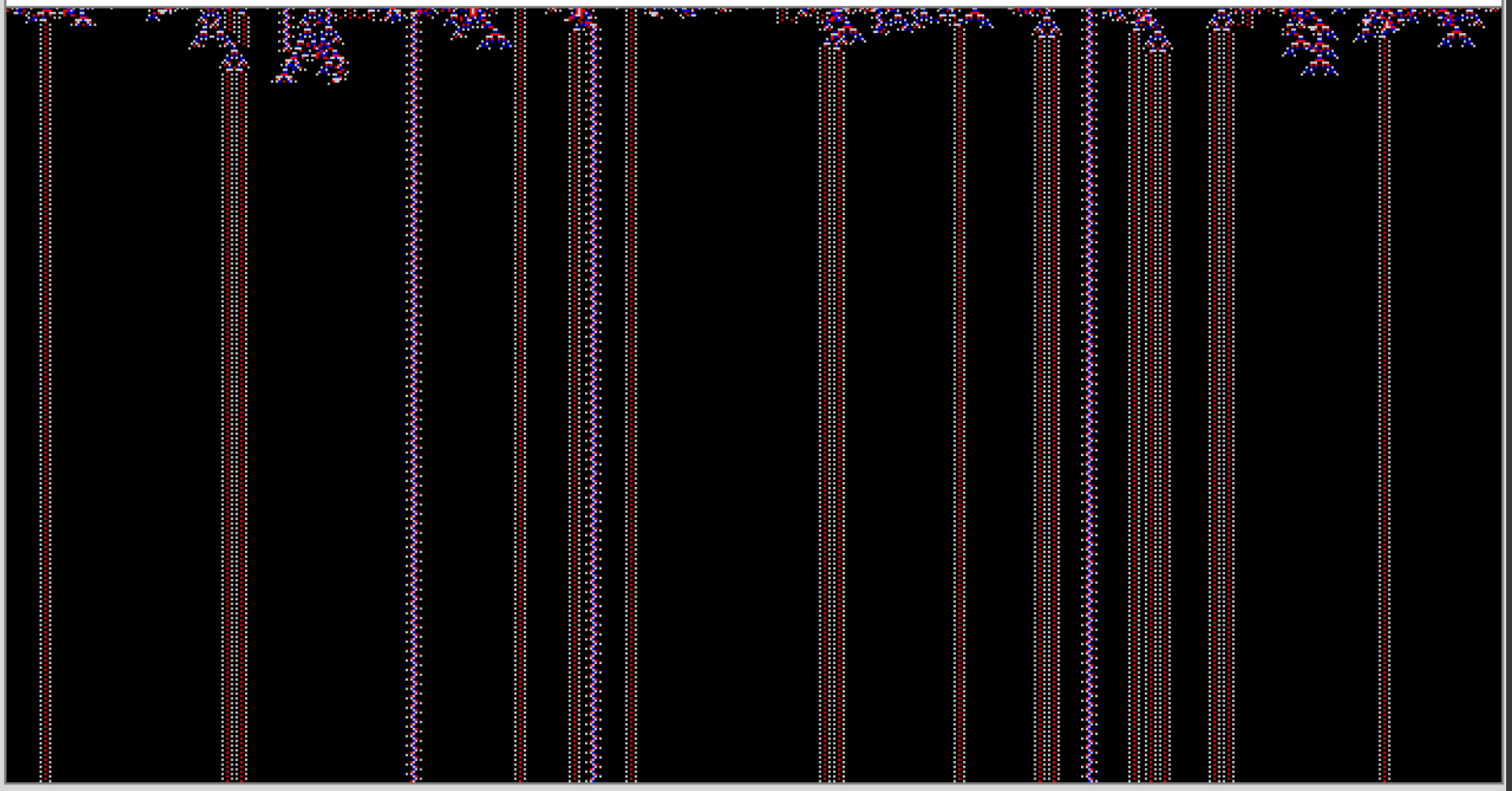
(None Available)

Undo Delete | Delete All!

4 states, 5 neighbors, isotropic, 544 rules

Rules In Use: 180

lambda = 0.3297



3. Run Fall.R (on Teams)

```
> # Install packages
> install.packages(c("gsubfn", "proto", "tidyverse"))
Installing packages into 'C:/Users/jnorcross/AppData/Local/R/win-library/4.4'
(as 'lib' is unspecified)
also installing the dependencies 'sys', 'bit', 'ps', 'askpass', 'bit64', 'processx', 'blob', 'DBI', 'gargle', 'uuid',
'curl', 'ids', 'rematch2', 'openssl', 'systemfonts', 'textshaping', 'clipr', 'vroom', 'callr', 'selectr', 'conflicted',
'dbplyr', 'dtplyr', 'forcats', 'googledrive', 'googlesheets4', 'haven', 'httr', 'ragg', 'readr', 'reprex',
'rstudioapi', 'rvest', 'xml2'

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/sys_3.4.2.zip'
Content type 'application/zip' length 47820 bytes (46 KB)
downloaded 46 KB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/bit_4.0.5.zip'
Content type 'application/zip' length 1148513 bytes (1.1 MB)
downloaded 1.1 MB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/ps_1.7.7.zip'
Content type 'application/zip' length 558285 bytes (545 KB)
downloaded 545 KB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/askpass_1.2.0.zip'
Content type 'application/zip' length 74672 bytes (72 KB)
downloaded 72 KB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/bit64_4.0.5.zip'
Content type 'application/zip' length 504401 bytes (492 KB)
downloaded 492 KB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/processx_3.8.4.zip'
Content type 'application/zip' length 688839 bytes (672 KB)
downloaded 672 KB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/blob_1.2.4.zip'
Content type 'application/zip' length 49776 bytes (48 KB)
downloaded 48 KB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/DBI_1.2.3.zip'
Content type 'application/zip' length 937691 bytes (915 KB)
downloaded 915 KB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/gargle_1.5.2.zip'
```

```
Content type 'application/zip' length 805267 bytes (786 KB)
downloaded 786 KB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/uuid_1.2-1.zip'
Content type 'application/zip' length 52934 bytes (51 KB)
downloaded 51 KB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/curl_5.2.2.zip'
Content type 'application/zip' length 3219668 bytes (3.1 MB)
downloaded 3.1 MB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/ids_1.0.1.zip'
Content type 'application/zip' length 126211 bytes (123 KB)
downloaded 123 KB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/rematch2_2.1.2.zip'
Content type 'application/zip' length 48738 bytes (47 KB)
downloaded 47 KB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/openssl_2.2.1.zip'
Content type 'application/zip' length 3401799 bytes (3.2 MB)
downloaded 3.2 MB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/systemfonts_1.1.0.zip'
Content type 'application/zip' length 1337398 bytes (1.3 MB)
downloaded 1.3 MB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/textshaping_0.4.0.zip'
Content type 'application/zip' length 1211742 bytes (1.2 MB)
downloaded 1.2 MB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/clipr_0.8.0.zip'
Content type 'application/zip' length 55550 bytes (54 KB)
downloaded 54 KB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/vroom_1.6.5.zip'
Content type 'application/zip' length 1343083 bytes (1.3 MB)
downloaded 1.3 MB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/callr_3.7.6.zip'
Content type 'application/zip' length 475648 bytes (464 KB)
downloaded 464 KB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/selectr_0.4-2.zip'
Content type 'application/zip' length 486470 bytes (475 KB)
downloaded 475 KB
```

```
trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/conflicted_1.2.0.zip'
Content type 'application/zip' length 57539 bytes (56 KB)
downloaded 56 KB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/dbplyr_2.5.0.zip'
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downloaded 1.2 MB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/dtplyr_1.3.1.zip'
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downloaded 350 KB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/forcats_1.0.0.zip'
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downloaded 418 KB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/googledrive_2.1.1.zip'
Content type 'application/zip' length 1908229 bytes (1.8 MB)
downloaded 1.8 MB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/googlesheets4_1.1.1.zip'
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downloaded 511 KB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/haven_2.5.4.zip'
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downloaded 754 KB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/httr_1.4.7.zip'
Content type 'application/zip' length 495901 bytes (484 KB)
downloaded 484 KB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/ragg_1.3.2.zip'
Content type 'application/zip' length 1966568 bytes (1.9 MB)
downloaded 1.9 MB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/readr_2.1.5.zip'
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downloaded 1.1 MB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/reprex_2.1.1.zip'
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downloaded 493 KB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/rstudioapi_0.16.0.zip'
Content type 'application/zip' length 339032 bytes (331 KB)
downloaded 331 KB
```

```
trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/rvest_1.0.4.zip'
Content type 'application/zip' length 308553 bytes (301 KB)
downloaded 301 KB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/xml2_1.3.6.zip'
Content type 'application/zip' length 1612979 bytes (1.5 MB)
downloaded 1.5 MB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/gsubfn_0.7.zip'
Content type 'application/zip' length 359568 bytes (351 KB)
downloaded 351 KB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/proto_1.0.0.zip'
Content type 'application/zip' length 473283 bytes (462 KB)
downloaded 462 KB

trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/tidyverse_2.0.0.zip'
Content type 'application/zip' length 431313 bytes (421 KB)
downloaded 421 KB

package 'sys' successfully unpacked and MD5 sums checked
package 'bit' successfully unpacked and MD5 sums checked
package 'ps' successfully unpacked and MD5 sums checked
package 'askpass' successfully unpacked and MD5 sums checked
package 'bit64' successfully unpacked and MD5 sums checked
package 'processx' successfully unpacked and MD5 sums checked
package 'blob' successfully unpacked and MD5 sums checked
package 'DBI' successfully unpacked and MD5 sums checked
package 'gargle' successfully unpacked and MD5 sums checked
package 'uuid' successfully unpacked and MD5 sums checked
package 'curl' successfully unpacked and MD5 sums checked
package 'ids' successfully unpacked and MD5 sums checked
package 'rematch2' successfully unpacked and MD5 sums checked
package 'openssl' successfully unpacked and MD5 sums checked
package 'systemfonts' successfully unpacked and MD5 sums checked
package 'textshaping' successfully unpacked and MD5 sums checked
package 'clipr' successfully unpacked and MD5 sums checked
package 'vroom' successfully unpacked and MD5 sums checked
package 'callr' successfully unpacked and MD5 sums checked
package 'selectr' successfully unpacked and MD5 sums checked
package 'conflicted' successfully unpacked and MD5 sums checked
package 'dbplyr' successfully unpacked and MD5 sums checked
package 'dtplyr' successfully unpacked and MD5 sums checked
package 'forcats' successfully unpacked and MD5 sums checked
package 'googledrive' successfully unpacked and MD5 sums checked
package 'googlesheets4' successfully unpacked and MD5 sums checked
```

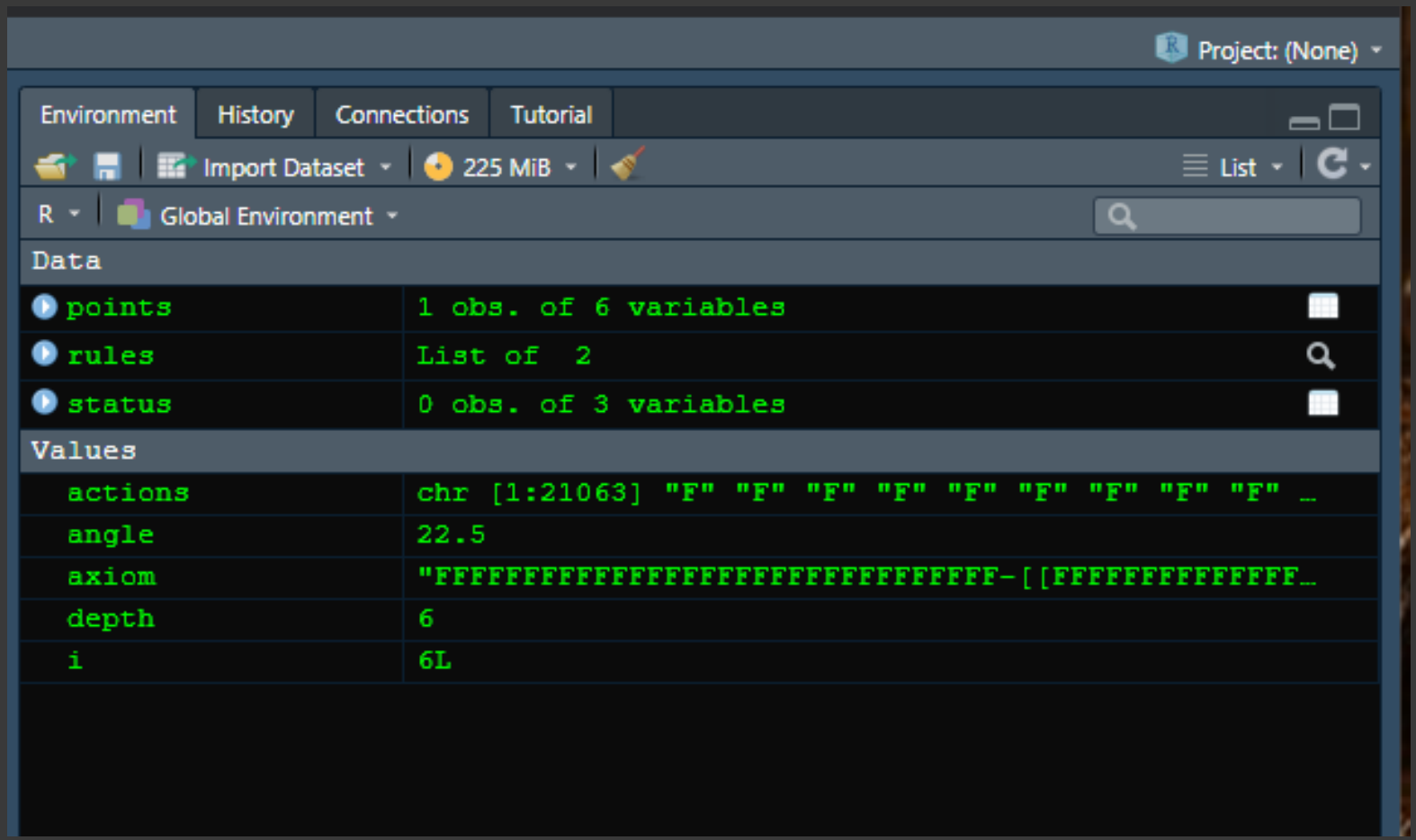
```
package 'haven' successfully unpacked and MD5 sums checked
package 'httr' successfully unpacked and MD5 sums checked
package 'ragg' successfully unpacked and MD5 sums checked
package 'readr' successfully unpacked and MD5 sums checked
package 'reprex' successfully unpacked and MD5 sums checked
package 'rstudioapi' successfully unpacked and MD5 sums checked
package 'rvest' successfully unpacked and MD5 sums checked
package 'xml2' successfully unpacked and MD5 sums checked
package 'gsubfn' successfully unpacked and MD5 sums checked
package 'proto' successfully unpacked and MD5 sums checked
package 'tidyverse' successfully unpacked and MD5 sums checked

The downloaded binary packages are in
      C:\Users\jnorcross\AppData\Local\Temp\RtmpOoMvDs\downloaded_packages



> library(gsubfn)
Loading required package: proto
> library(tidyverse)
── Attaching core tidyverse packages ──────────────────────────────────────────────────────────────────────────────────────── tidyverse 2.0.0 ──
✓ dplyr     1.1.4     ✓ readr     2.1.5
✓ forcats   1.0.0     ✓ stringr   1.5.1
✓ ggplot2   3.5.1     ✓ tibble    3.2.1
✓ lubridate 1.9.3     ✓ tidyr     1.3.1
✓ purrr     1.0.2
── Conflicts ────────────────────────────────────────────────────────────────────────────────────────────────────────────────────
tidyverse_conflicts() ──
✖ dplyr::filter() masks stats::filter()
✖ dplyr::lag()    masks stats::lag()
ℹ Use the conflicted package to force all conflicts to become errors
```

```
# Define elements in plant art
# Each image corresponds to a different axiom, rules, angle and depth
# Leaf of Fall
axiom="X"
rules=list("X"="F-[[X]+X]+F[+FX]-X", "F"="FF")
angle=22.5
depth=6
for (i in 1:depth) axiom=gsubfn(".", rules, axiom)
actions=str_extract_all(axiom, "\\d*\\+|\\d*\\-|F|L|R|\\[|\\]|\\|") %>% unlist
status=data.frame(x=numeric(0), y=numeric(0), alfa=numeric(0))
points=data.frame(x1 = 0, y1 = 0, x2 = NA, y2 = NA, alfa=90, depth=1)
```



```
> for (action in actions)
+ {
+   if (action=="F")
+   {
+     x=points[1, "x1"]+cos(points[1, "alfa"]*(pi/180))
+     y=points[1, "y1"]+sin(points[1, "alfa"]*(pi/180))
+     points[1,"x2"]=x
+     points[1,"y2"]=y
+     data.frame(x1 = x, y1 = y, x2 = NA, y2 = NA,
+                alfa=points[1, "alfa"],
+                depth=points[1,"depth"]) %>% rbind(points)->points
+   }
+   if (action %in% c("+", "-")){
+     alfa=points[1, "alfa"]
+     points[1, "alfa"]=eval(parse(text=paste0("alfa",action, angle)))
+   }
+   if(action=="["){
+     data.frame(x=points[1, "x1"], y=points[1, "y1"], alfa=points[1, "alfa"]) %>%
+       rbind(status) -> status
+     points[1, "depth"]=points[1, "depth"]+1
+   }
+
+   if(action=="]"){
+     depth=points[1, "depth"]
+     points[-1,]->points
+     data.frame(x1=status[1, "x"], y1=status[1, "y"], x2=NA, y2=NA,
+                alfa=status[1, "alfa"],
+                depth=depth-1) %>%
+       rbind(points) -> points
+     status[-1,]->status
+   }
+ }
> ggplot() +
+   geom_segment(aes(x = x1, y = y1, xend = x2, yend = y2),
+                lineend = "round",
+                color="burlywood3", # Set your own Fall color?
+                data=na.omit(points)) +
+   coord_fixed(ratio = 1) +
+   theme_void() # No grid nor axes
```

3a. Give your own colors (e.g. Winter).

```
> ggplot() +
+     geom_segment(aes(x = x1, y = y1, xend = x2, yend = y2, color = x1), # Use x1 to map to color
+                  lineend = "round",
+                  data=na.omit(points)) +
+     scale_color_gradientn(colors = c("#FF00FF", "#00FFFF", "#FFFF00", "#FF1493", "#32CD32", "#8A2BE2")) + # Unique
rainbow colors
+     coord_fixed(ratio = 1) +
+     theme_void() # No grid nor axes
```

3b. Export the file and post on your GitHub website.