- 1. Let's create some aRt!
 - (a) Install the aRtsy package. Provide the code in an R chunk that does not run. You only need to install it one time. Solution:

Code to install the aRtsy package
install.packages("aRtsy")

(b) Load the aRtsy package. Provide the code in an R chunk that does run. We need to load the library each time it is run. Solution:

```
# Code to load aRtsy Library
library(aRtsy)
```

(c) Running demo("aRtsy") or vignette("aRtsy") don't return any helpful demos or tutorials. However, if you run help("aRtsy") you will find a link to a tutorial. Recreate the first figure they make using canvas_collatz(). Make sure to update the caption. Solution:

```
# help("aRtsy")
set.seed(1)
canvas_collatz(colors = colorPalette("tuscany3"))
```



Figure 1: Art With Seed 1

(d) Change the randomization seed to 1313, which will change the random numbers generated to create the plot. Can you see the difference? Make sure to update the caption.

Solution:

```
set.seed(1313)
canvas_collatz(colors = colorPalette("tuscany3"))
```



Figure 2: Art With Seed 1313

- (e) Now, create a new Collatz conjecture plot by specifying the following arguments. Note you will find the help file for the canvas_collatz() function to be rather helpful. Make sure to update the caption.
 - Use the vrolik4 color palette. Note you can find other by running ?colorPalette in the console.
 - Make the background grey. Note a hexcode for grey is #dbdbdb.
 - Specify that there should be 72 strands.
 - \bullet Specify the angle used for bending the sequence for odd numbers as -0.05.
 - Specify the angle used for bending the sequence for even numbers as 0.0145 (note this is the default).

Solution:

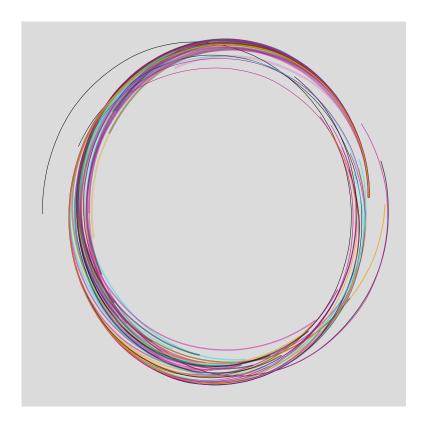


Figure 3: Art Circle With Grey Background

(f) Make another plot using the tutorial – feel free to be creative here! Note that I leave creating the R chunk and figure environment to you here. Make sure that your code is well-formatted and your plot is appropriately scaled.

Solution:

(g) Use citation() to get the BiBTeX citation for the aRtsy package and use \citep{} to add a parenthetical citation to the end of the sentence below. Solution: We created the generative art in Question 1 using the aRtsy package for R.

- 2. Suppose we wanted to solve $2^{x+1} + 2^{x-1} = 40$ for x. While this is a pretty straightforward algebra problem, it's useful for demonstrating the use of objects in R.
 - (a) Create a numeric vector containing the integers from 0 to 10 inclusive. Hint the solution to this problem is one of these values.

Solution:

(b) Complete the algebra to compute $2^{x+1} + 2^{x-1}$ for each value in the numerical vector created in step 1. Make sure to save the result to a new numeric vector.

Solution:

(c) Use the which() function to ask which result is 40.

Solution:

(d) What is the solution? That is, what value of x yields $2^{x+1} + 2^{x-1} = 40$?

Solution:

(e) Explain why this approach wouldn't work for something like $3^{x+2} + 5(3^x) = 84$ where the solution is $x \approx 1.6309$.

Solution: