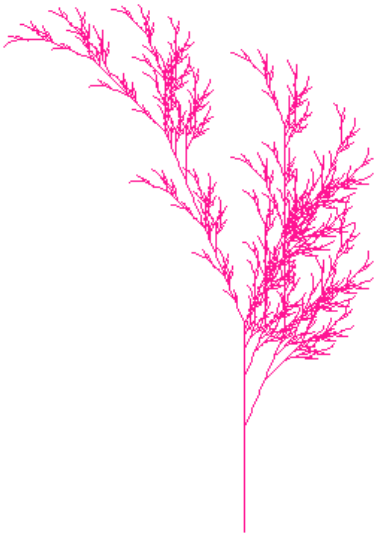
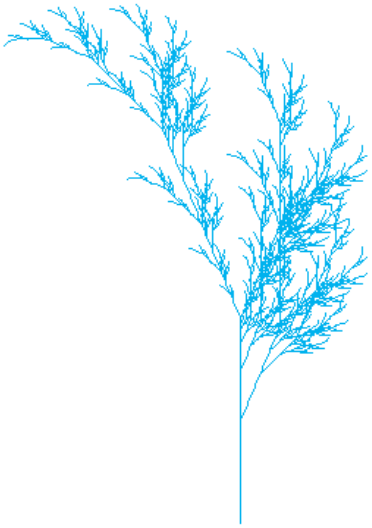
**Assignment 1 – Fall Leaf**
**R Program Renderings**
**09/08/22**

Below are renderings from the Fall leaf R program (see below). The first imagine is in the original program's "burlywood3" color. The next imagine is in "darkgreen." The third rendering is in "deepink" and the final imagine is “deepskyblue2”





## R Code

```
# Title Fall color
# Credit: https://fronkonstin.com
# Install packages
install.packages("gsubfn")
install.packages("tidyverse")
library(gsubfn)
library(tidyverse)
# 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)
# Generating data
# Note: may take a minute or two
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="deeppink", # Set your own Fall color?
            data=na.omit(points)) +
  coord_fixed(ratio = 1) +
  theme_void() # No grid nor axes
```