

Drawing a Christmas card with the ggplot2 package

Ken Vu

Cascadia R Conference | June 22, 2024

I. Introduction

Around the time I got my MS in Stats, I was slowly losing my R knowledge



I wanted to spread joy for the Christmas holiday season



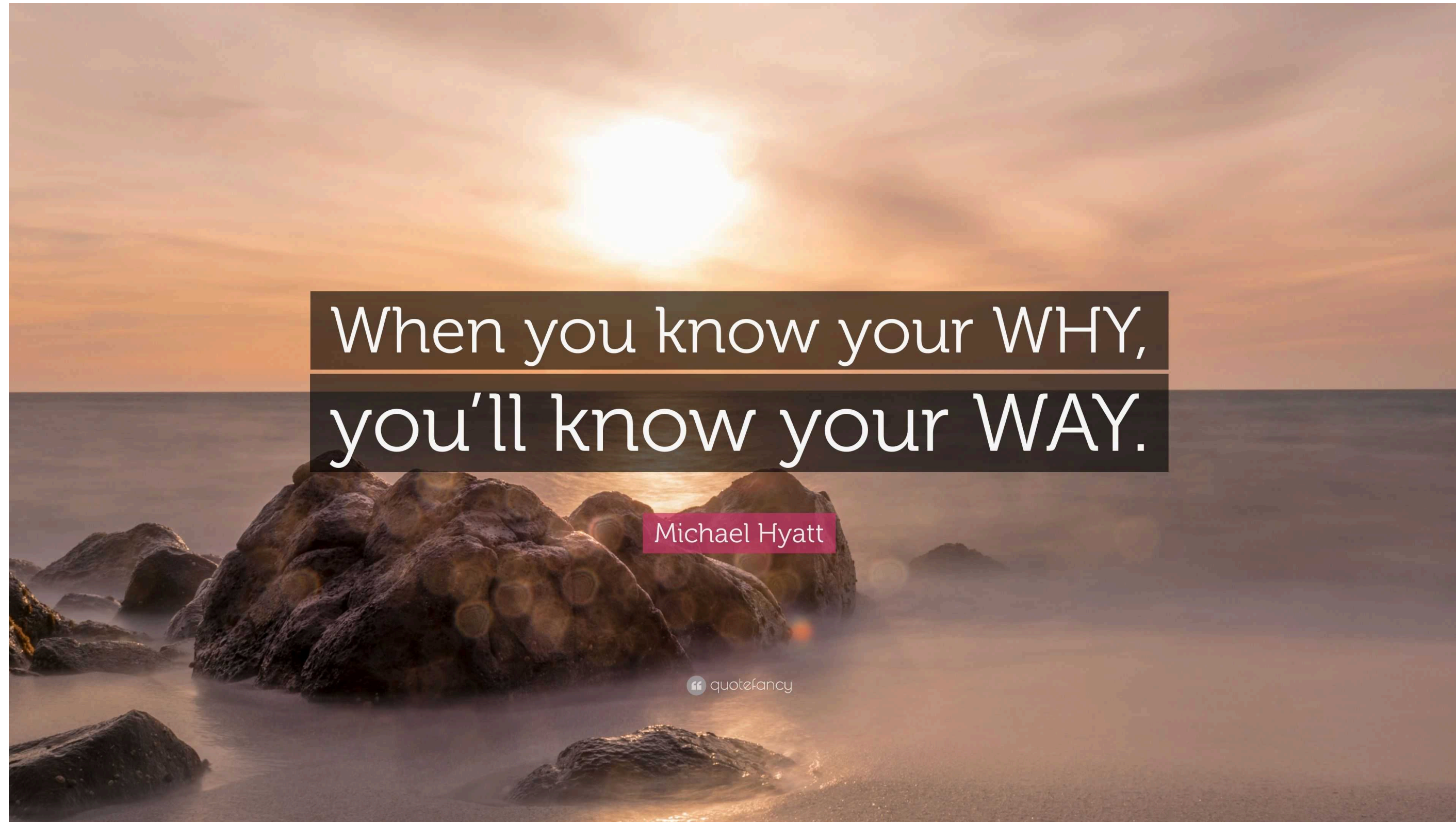
So what did I decide to do then?

- **BUILD A CHRISTMAS CARD...WITH R CODE!!!**

II. The Design Process

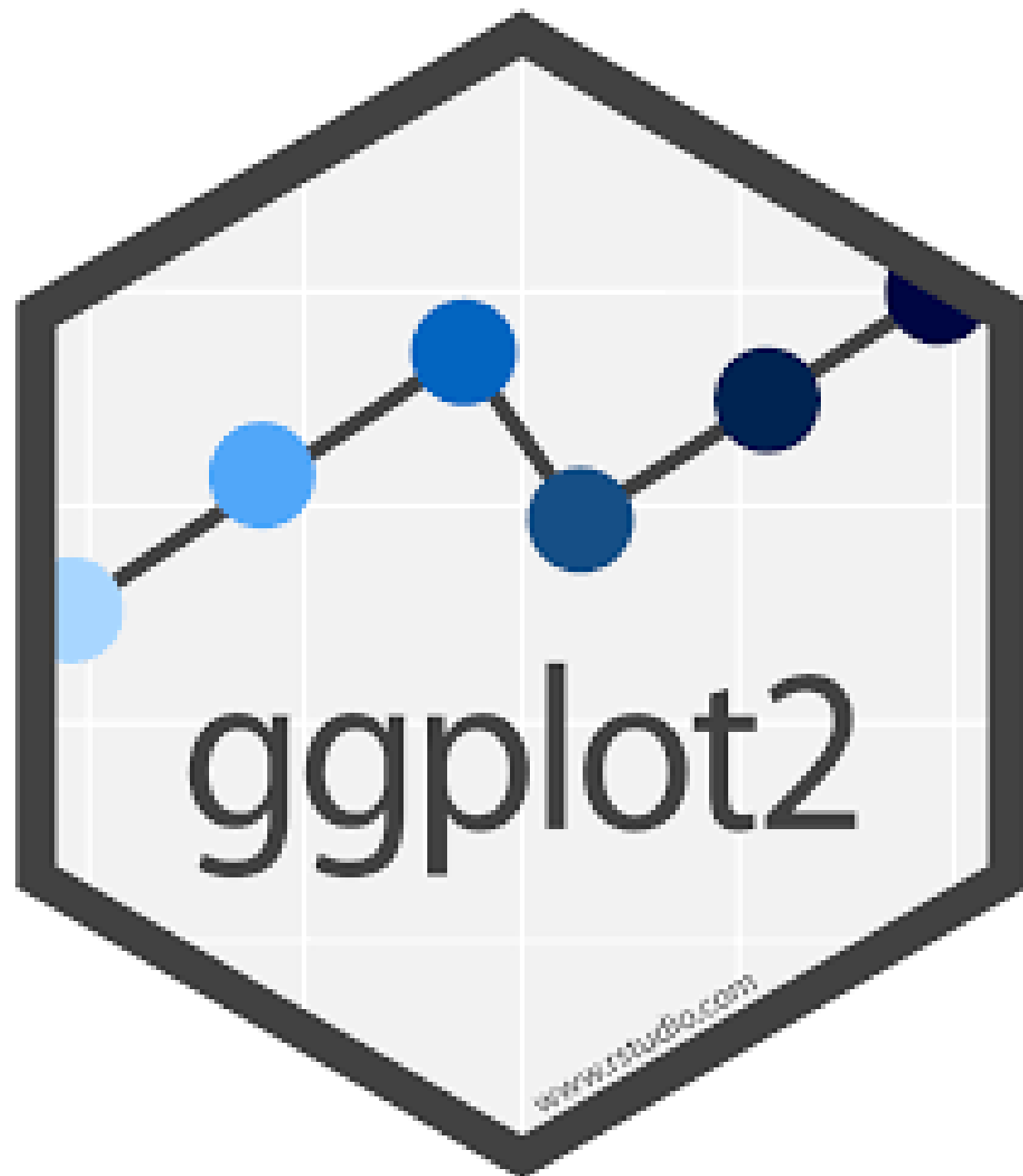
STEP 1: Brainstorm the idea

Find my motivation



STEP 2: Research your tools

Chose the ggplot2 package due to popularity, familiarity, and customization



STEP 2: Research your tools

- Additional packages
 - `extrafont`: for loading in custom fonts
 - `dplyr`: for wrangling and working with data frames

STEP 3: Build the card

- With plotting any `ggplot2` object
 - First, pick a `ggplot2` function
 - Next, build a compatible set of points
 - Then, plot them (with or without adjustments)

STEP 3: Build the card

- Ex. Build the base of the Christmas tree
- First, find a function to meet your needs (i.e., `geom_polygon` for drawing shapes)

STEP 3: Build the card

Set up coordinates for the tree base and tree trunk to fit `geom_polygon`'s plotting requirements

```
1 xmas_tree <- tribble(  
2   ~x, ~y,  
3  
4   # left side of tree base  
5   -6, 5,  
6   -3, 10,  
7   -4.5, 10,  
8   -2, 15,  
9  
10  # top of tree  
11  -3, 15,  
12  0, 20
```

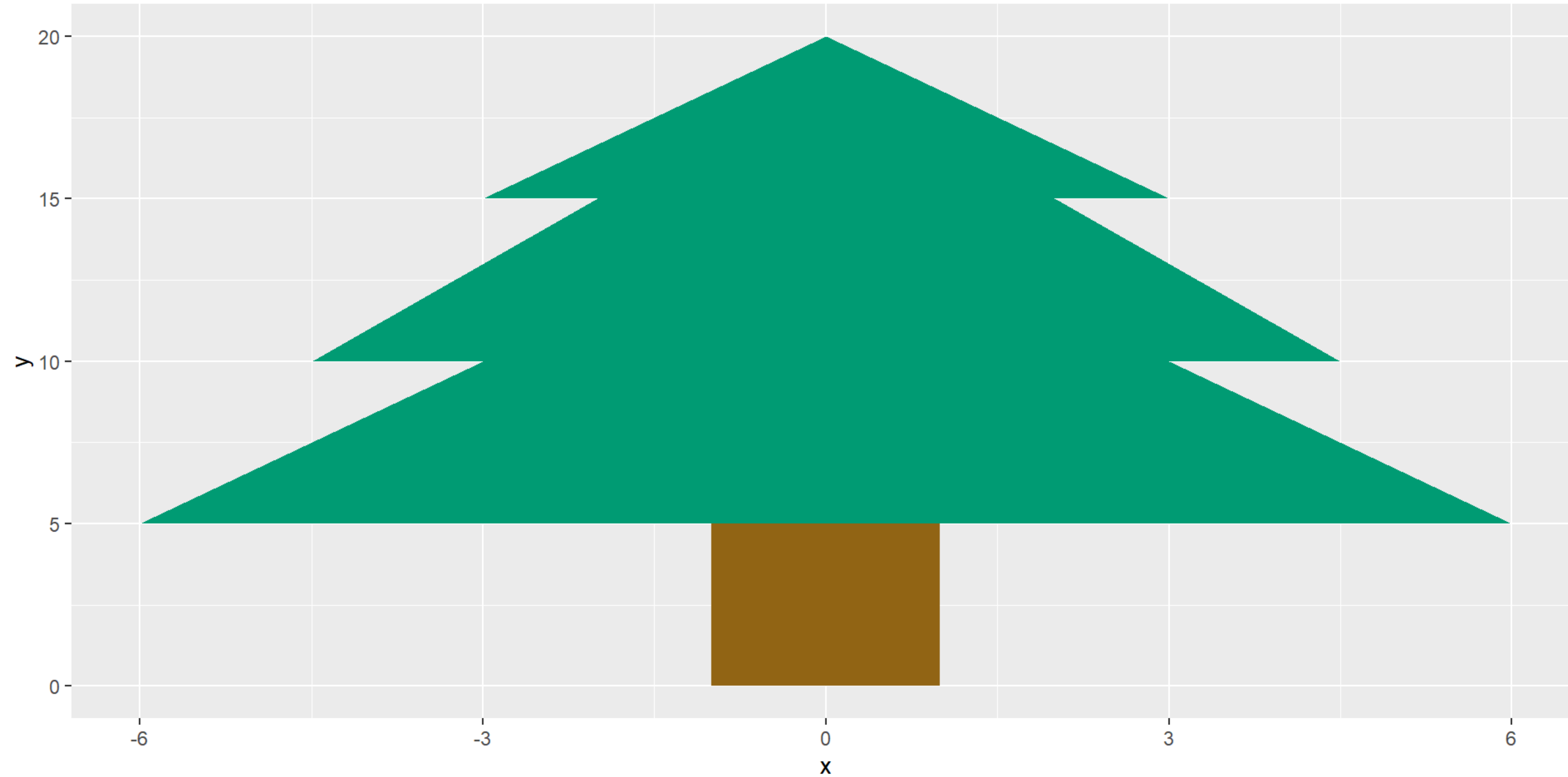
STEP 3: Build the card

Use `geom_polygon()` to draw shapes with coordinates (i.e., tree base and trunk)

```
1 xmas_ggplot <- ggplot() +  
2  
3   # adding tree  
4   geom_polygon(data = xmas_tree,  
5                 mapping = aes(x, y),  
6                 fill = "#009E73") +  
7  
8   # adding trunk  
9   geom_polygon(data = xmas_trunk,  
10                mapping = aes(x, y),  
11                fill = "#926718")  
12
```

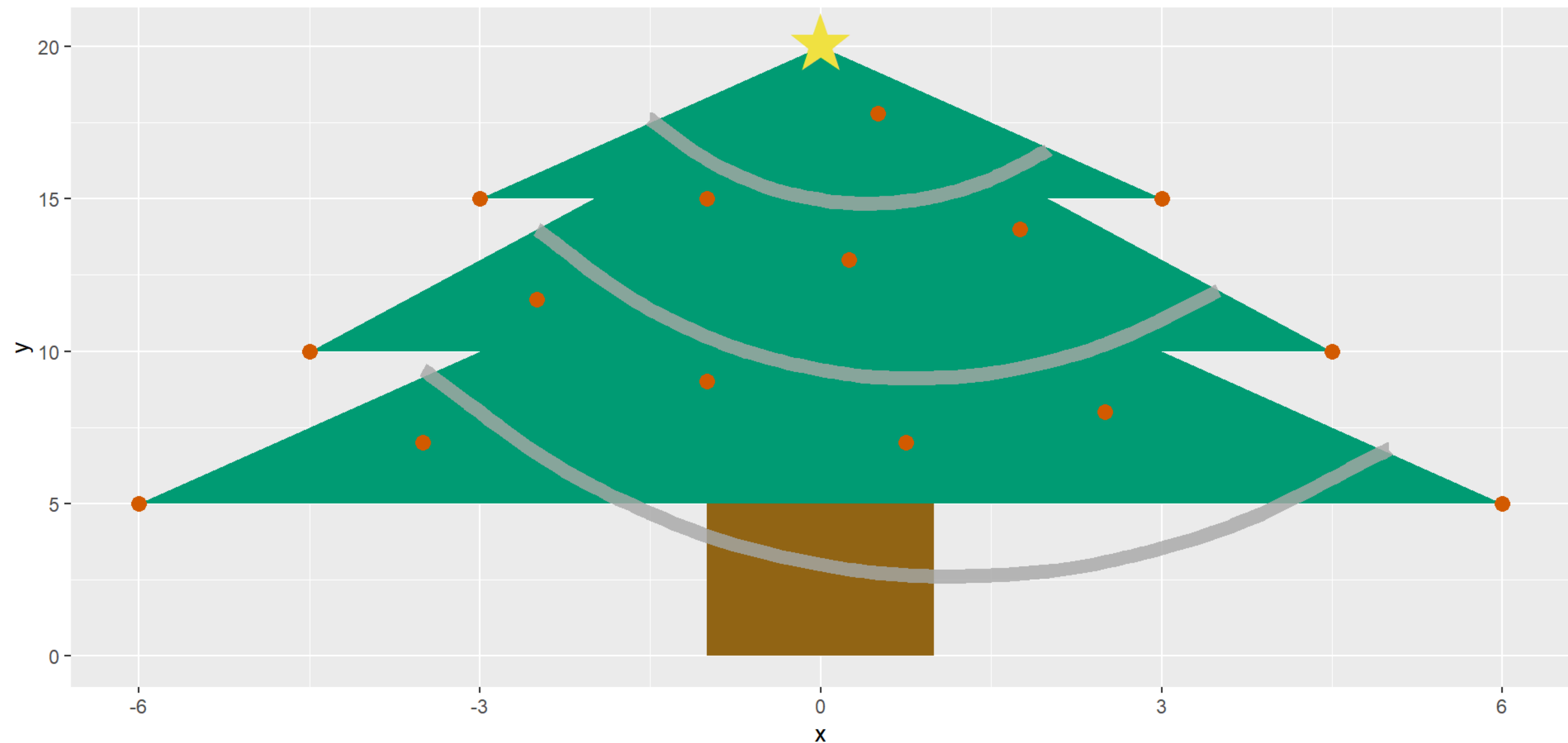

STEP 3: Build the card

```
1 xmas_ggplot
```



STEP 3: Build the card

This approach used for almost every aspect of the card to get this so far...



Made with RStudio

STEP 3: Build the card

Replace data viz elements (i.e., tick marks, axes labels, gridlines, etc) with festive aesthetics

```
1 xmas_ggplot <- xmas_ggplot +  
2   theme(  
3     # make panel background black  
4     panel.background = element_rect(fill = "black"),  
5  
6     # removing misc plotting elements  
7     axis.title = element_blank(),  
8     axis.ticks = element_blank(),  
9     axis.text = element_blank(),  
10    panel.grid = element_blank(),  
11  
12    # adding brown frame around photo
```


STEP 3: Build the card

Add some falling snow

```
1 # TRIVIA: the seed number is the release date # of the song "Last Christmas" by Wham! (
2 set.seed(120384)
3
4 snow_points <- data.frame(
5   x = runif(n = 300, min = -20, max = 17),
6   y = runif(n = 300, min = -2, max = 36)
7 )
8
9 xmas_ggplot <- xmas_ggplot +
10   geom_point(data = snow_points,
11             mapping = aes(x, y),
12             color = "white")
```

STEP 3: Build the card

Add a snowy ground

```
1 # add points marking peaks of bumpy snowy
2 # ground
3 xmas_snowground <- tribble(
4   ~x, ~y,
5   -30, 2.5,
6   -10, 0.5,
7   -5, 1.5,
8   0, 0.2,
9   5, 0.8,
10  12, 0.4,
11  30, 1
12 )
```

STEP 3: Build the card

Add a snowy ground

```
1 xmas_ggplot<- xmas_ggplot +
2   # plotting an uneven snowy ground
3   geom_ribbon(data = xmas_snowground,
4               aes(x = x, ymax=y),
5               xmin = -Inf,
6               xmax = Inf,
7               ymin = 0,
8               fill="white") +
9
10  # adding a flat horizontal line for the snowy ground
11  geom_hline(yintercept = seq(0.5, -50, -0.01),
12             color = "white")
```


STEP 3: Build the card

```
1 xmas_ggplot
```



STEP 3: Build the card

- Used `coord_cartesian` to zoom in where tree is without throwing out points out of range

```
1 xmas_ggplot <- xmas_ggplot +  
2  
3   # expand plotting limits  
4   coord_cartesian(ylim = c(0, 35), xlim = c(-15, 15))
```

STEP 3: Build the card

Now, add a holiday greeting

```
1 font_import(paths = getwd(), prompt = F)
2 loadfonts()
3
4 xmas_ggplot <- xmas_ggplot +
5 # adding holiday greeting
6   geom_text(aes(label = "Happy Holidays!",
7                 x = 0, y = 29),
8             color = "#F0E442",
9             size = 16,
10            family = "Segoe Script") +
11
12 # adjusting the caption text
```

STEP 3: Build the card

So far, looks good...

```
1 xmas_ggplot
```





STEP 3: Build the card

- Building the snowman still involves finding the right `ggplot2` functions, making points, and plotting them

STEP 3: Build the card

- Built snowman with functions `geom_point()`, `geom_segment()`, and `geom_curve()`



STEP 3: Build the card

Add hat for snowman

```
1 # coordinates for top of the hat
2 snowman_hat_top <- tribble(
3   ~x0, ~x1, ~y0, ~y1,
4   9.25, 10.75, 14.5, 17
5 )
6
7 xmas_ggplot <- xmas_ggplot +
8   # hat top
9   geom_rect(
10     data = snowman_hat_top,
11     mapping = aes(xmin = x0, ymin = y0,
12                   xmax = x1, ymax = y1)
```

STEP 3: Build the card

Add hat for snowman

```
1 xmas_ggplot <- xmas_ggplot +  
2  
3     # hat base  
4     geom_segment(  
5         data = data.frame(x = 8.5, y = 14,  
6                             xend = 11.5, yend = 14),  
7         mapping = aes(x = x, y = y,  
8                         xend = xend, yend = yend),  
9         color = "#404040",  
10        lineend = "round",  
11        size = 2  
12    ) +
```

STEP 3: Build the card

Add scarf

```
1 # two tribbles for coordinates for parts of the scarf
2 snowman_scarf <- tribble(
3   ~x, ~y, ~xend, ~yend,
4   9, 10, 11, 10
5 )
6
7 snowman_scarf2 <- tribble(
8   ~x, ~y, ~xend, ~yend,
9   9.25, 10, 8, 6
10 )
```


STEP 3: Build the card

Add scarf

```
1 xmas_ggplot <- xmas_ggplot +  
2  
3 # draw the scarf  
4 geom_curve(data = snowman_scarf2,  
5           mapping = aes(x = x, y = y,  
6                         xend = xend,  
7                         yend = yend),  
8           linewidth = 3,  
9           color = "#56B4E9",  
10          curvature = -0.25) +  
11  
12 geom_curve(data = snowman_scarf
```

**...and, the moment you've
been waitin for!**

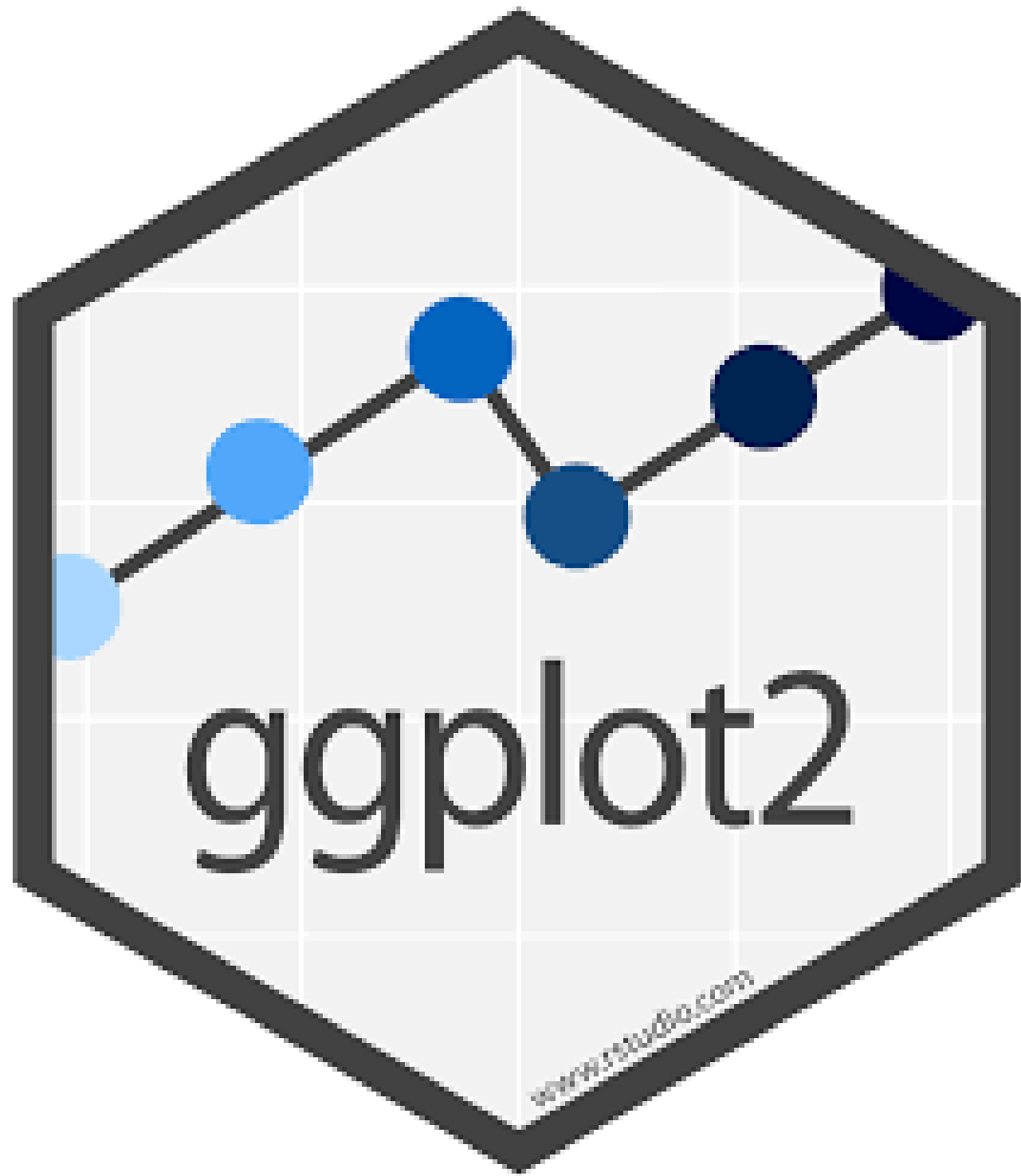
Ta da!



III. Conclusion

Three takeaways from this Christmas card project

1. I learned more about how the `ggplot2` library works



2. I got better at staying organized with complex projects



**These two lessons are valid,
but not as important as this
one...**

3. Be yourself as you KEN do it!



Thank you so much!

Here's where to connect with me!

 @kenvu777

 linkedin.com/in/kenvu1

 [Ken-Vu](#)

 [Slides](#)

Scan to see all my links:



