

The Rose

Gina Reynolds, June 2021

I saw the rose posted recently by Antonio Sánchez Chinchón @aschinchon.

I liked what I was looking at, but didn't really 'get' what was going on - even with the code posted alongside.

I used that and other code posted by Alex as the basis for exploring w/ ggplot2 and flipbookr:

<https://cpastem.caltech.edu/documents/18024/ARt.nb.html>

Overview

The rose/flower is ...

Overview

The rose/flower is ...

- a grid of points

Overview

The rose/flower is ...

- a grid of points
- where x positions are offset based on the sin of y

Overview

The rose/flower is ...

- a grid of points
- where x positions are offset based on the \sin of y
- and y positions are offset based on the \cos of x

Overview

The rose/flower is ...

- a grid of points
- where x positions are offset based on the sin of y
- and y positions are offset based on the cos of x
- and the coordinate system is polar.

Overview

The rose/flower is ...

- a grid of points
- where x positions are offset based on the sin of y
- and y positions are offset based on the cos of x
- and the coordinate system is polar.
- Also, the sin and cosine waves accelerate

First the x position.

the x grid position is offset ...

- into a wave based on the sin of y

First the x position.

the x grid position is offset ...

- into a wave based on the sin of y
- and the waves accelerate moving away from the x axis, so actually y^2

First the x position.

the x grid position is offset ...

- into a wave based on the sin of y
- and the waves accelerate moving away from the x axis, so actually y^2
- *in ggplot2 updating x positions by overwriting with aes(x = ?) statements*

First the x position.

the x grid position is offset ...

- into a wave based on the sin of y
- and the waves accelerate moving away from the x axis, so actually y^2
- *in ggplot2 updating x positions by overwriting with aes(x = ?) statements*
- and the pattern is reflected across the x axis

First the x position.

the x grid position is offset ...

- into a wave based on the sin of y
- and the waves accelerate moving away from the x axis, so actually y^2
- *in ggplot2 updating x positions by overwriting with aes(x = ?) statements*
- and the pattern is reflected across the x axis
- *adding a geom_point layer where the sign of y is negative*

```
seq(0, 4, by = .1)
```

```
[1] 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8  
[20] 1.9 2.0 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 3.0 3.1 3.2 3.3 3.4 3.5 3.6 3.7  
[39] 3.8 3.9 4.0
```

```
seq(0, 4, by = .1) ->  
my_seq
```

```
seq(0, 4, by = .1) ->  
  my_seq  
  
tibble(x = my_seq)
```

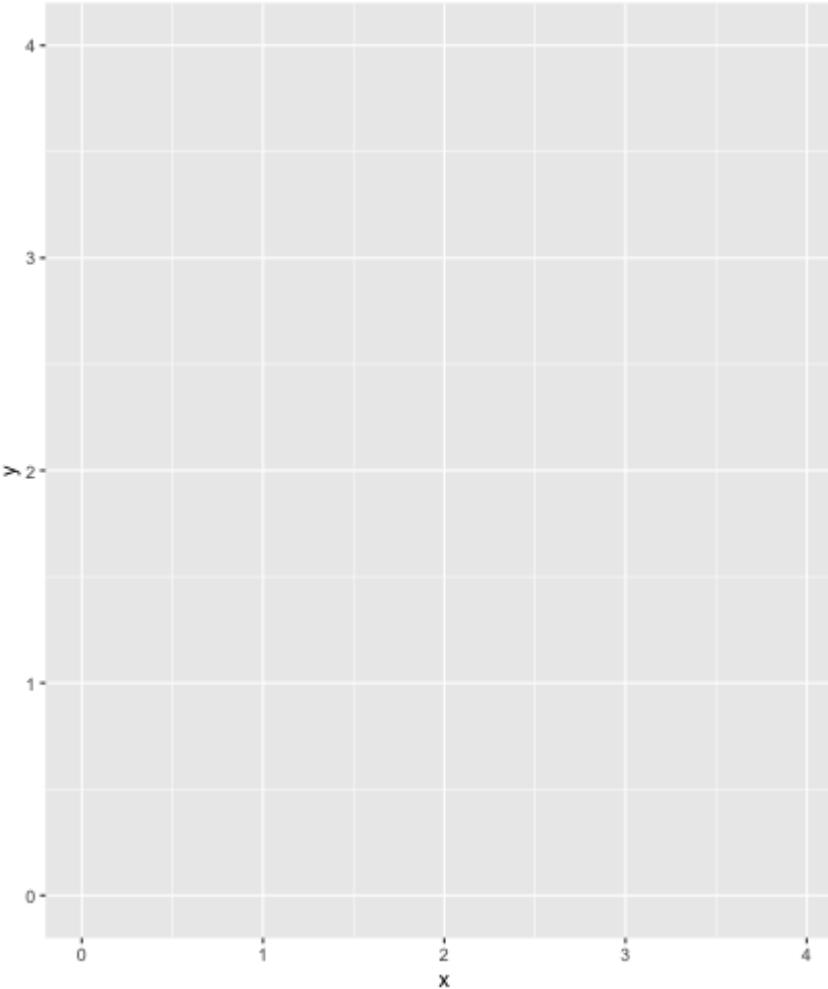
```
# A tibble: 41 x 1  
      x  
   <dbl>  
1     0  
2     0.1  
3     0.2  
4     0.3  
5     0.4  
6     0.5  
7     0.6  
8     0.7  
9     0.8  
10    0.9  
# ... with 31 more rows
```

```
seq(0, 4, by = .1) ->  
  my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq)
```

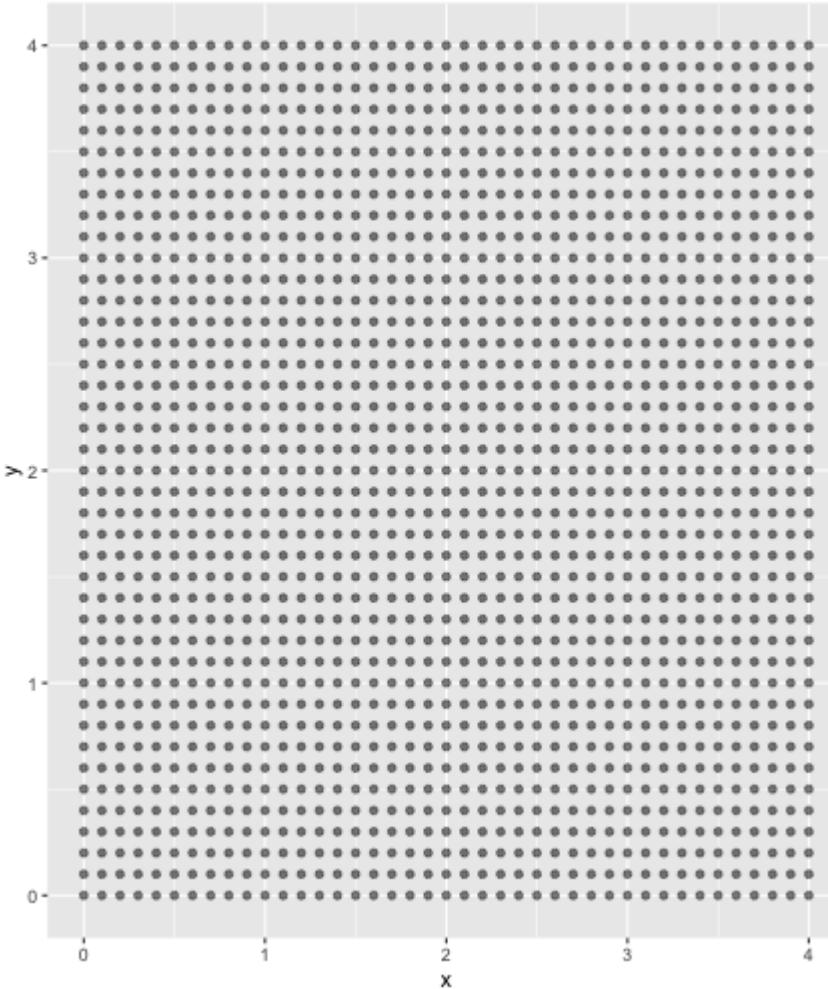
```
# A tibble: 1,681 x 2  
      x     y  
  <dbl> <dbl>  
1     0     0  
2     0     0.1  
3     0     0.2  
4     0     0.3  
5     0     0.4  
6     0     0.5  
7     0     0.6  
8     0     0.7  
9     0     0.8  
10    0     0.9  
# ... with 1,671 more rows
```

```
seq(0, 4, by = .1) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot()
```

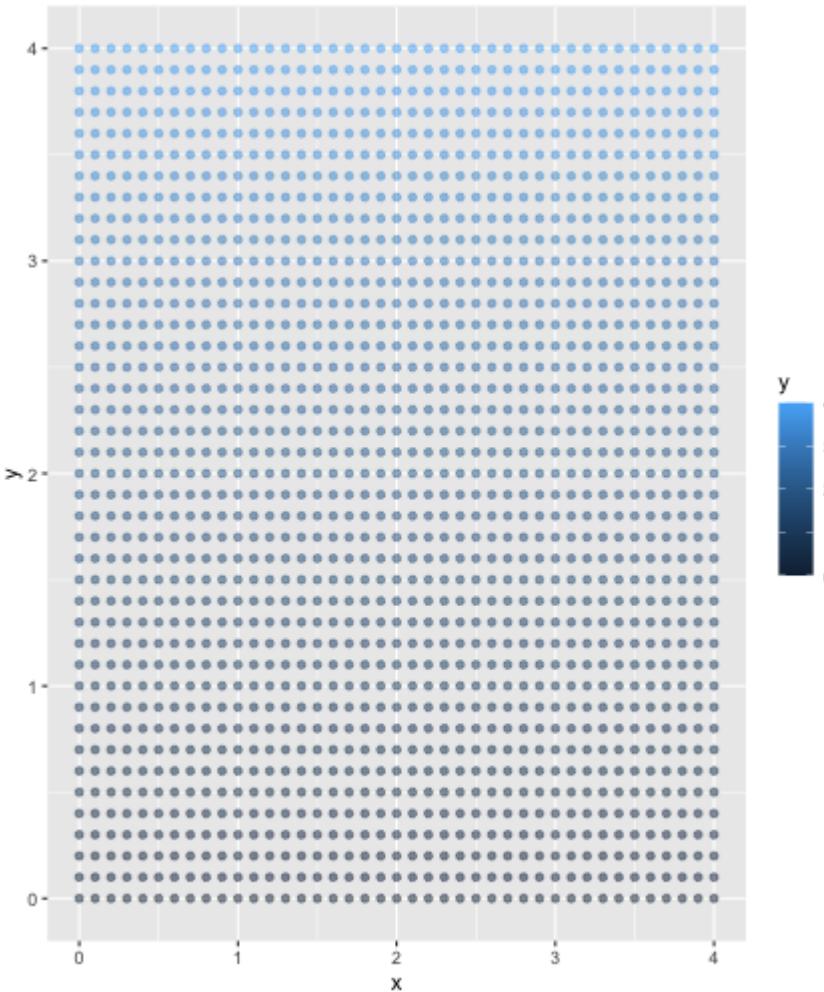
```
seq(0, 4, by = .1) ->  
my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot() +  
    aes(x = x,  
        y = y)
```



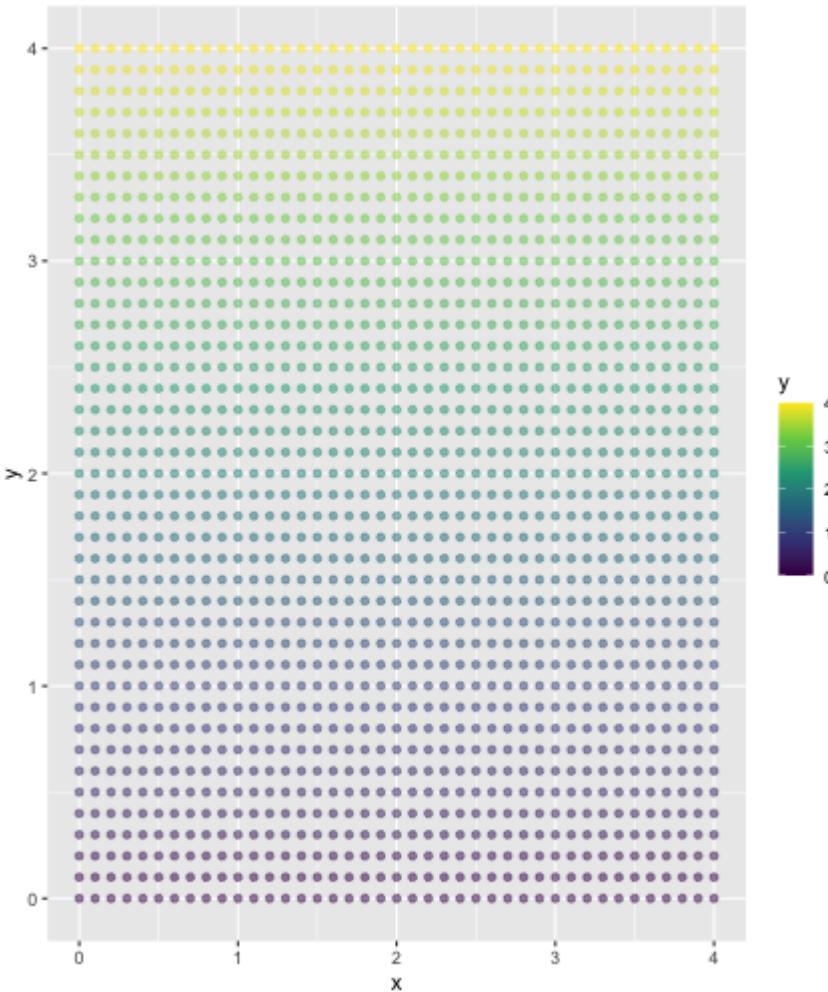
```
seq(0, 4, by = .1) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x,  
y = y) +  
geom_point(alpha = .5)
```



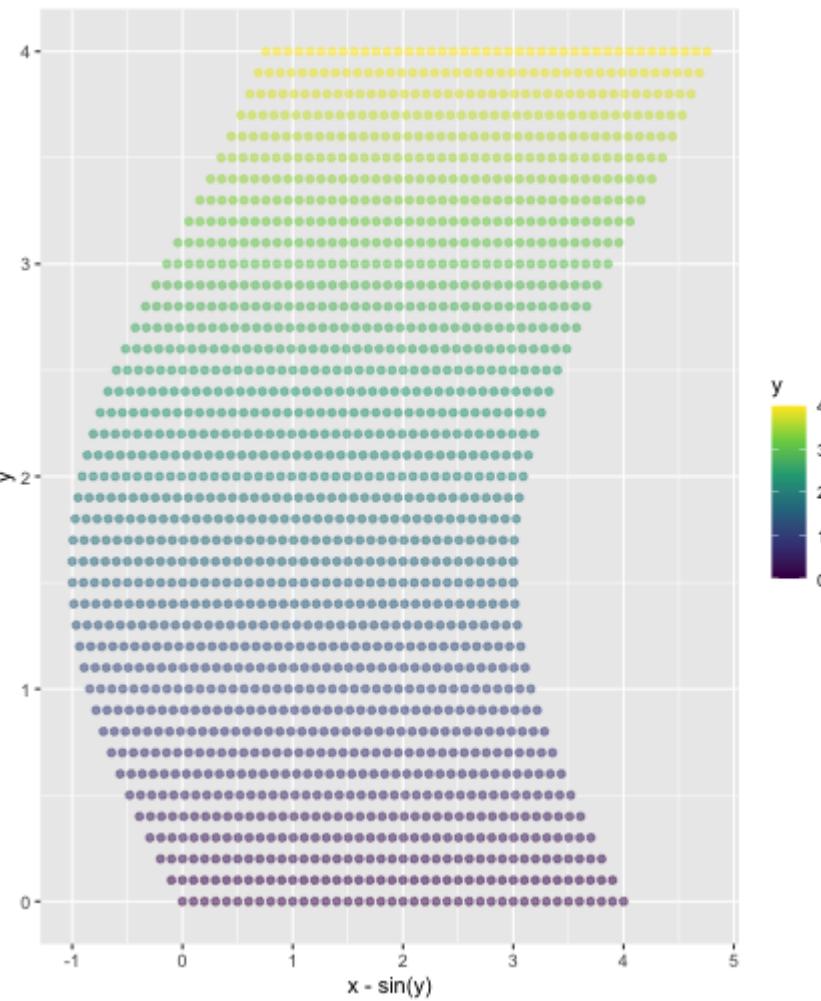
```
seq(0, 4, by = .1) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x,  
y = y) +  
geom_point(alpha = .5) +  
aes(color = y)
```



```
seq(0, 4, by = .1) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x,  
y = y) +  
geom_point(alpha = .5) +  
aes(color = y) +  
scale_color_viridis_c()
```



```
seq(0, 4, by = .1) ->  
  my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot() +  
  aes(x = x,  
      y = y) +  
  geom_point(alpha = .5) +  
  aes(color = y) +  
  scale_color_viridis_c() +  
  aes(x = x - sin(y))
```

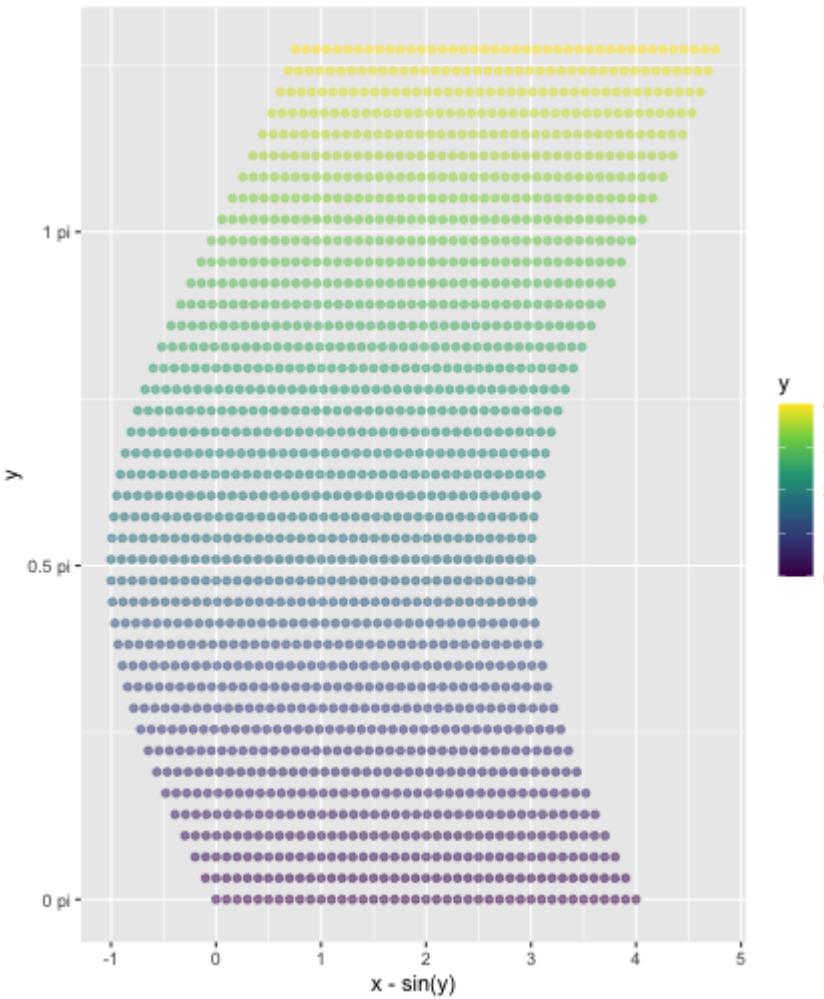


```

seq(0, 4, by = .1) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .5) +
  aes(color = y) +
  scale_color_viridis_c() +
  aes(x = x - sin(y)) +
  scale_y_continuous(
    breaks = -2:2/2*pi,
    labels = paste(-2:2/2, "pi")
  )

```

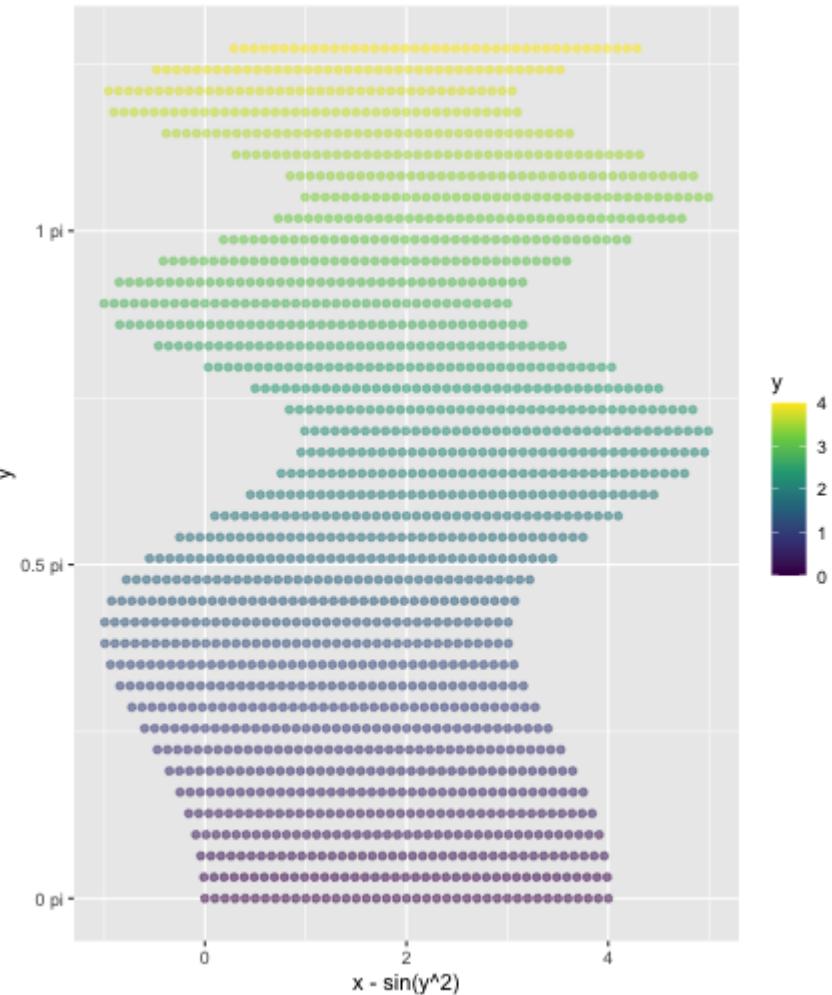


```

seq(0, 4, by = .1) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .5) +
  aes(color = y) +
  scale_color_viridis_c() +
  aes(x = x - sin(y)) +
  scale_y_continuous(
    breaks = -2:2/2*pi,
    labels = paste(-2:2/2, "pi")
  ) +
# where waves are accelerating
  aes(x = x - sin(y^2))

```

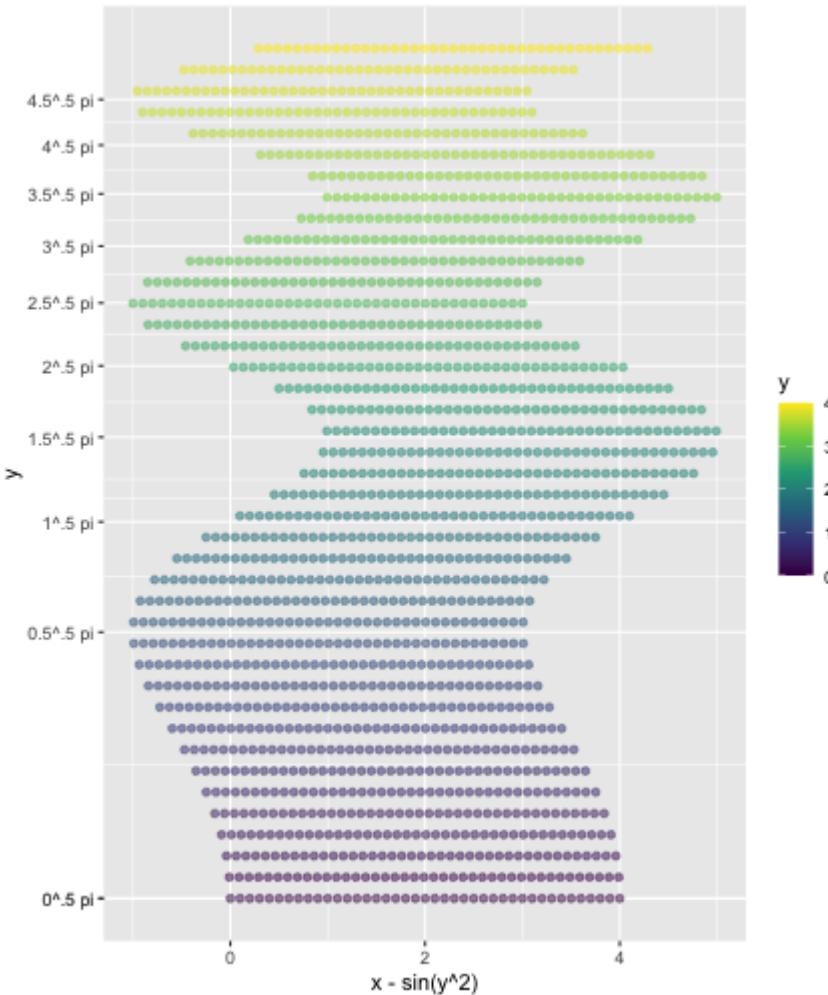


```

seq(0, 4, by = .1) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .5) +
  aes(color = y) +
  scale_color_viridis_c() +
  aes(x = x - sin(y)) +
  scale_y_continuous(
    breaks = -2:2/2*pi,
    labels = paste(-2:2/2, "pi")
  ) +
# where waves are accelerating
  aes(x = x - sin(y^2)) +
  scale_y_continuous(breaks = c((0:9/2*pi)^.5,
                                labels = paste0(c((0:9/2)

```

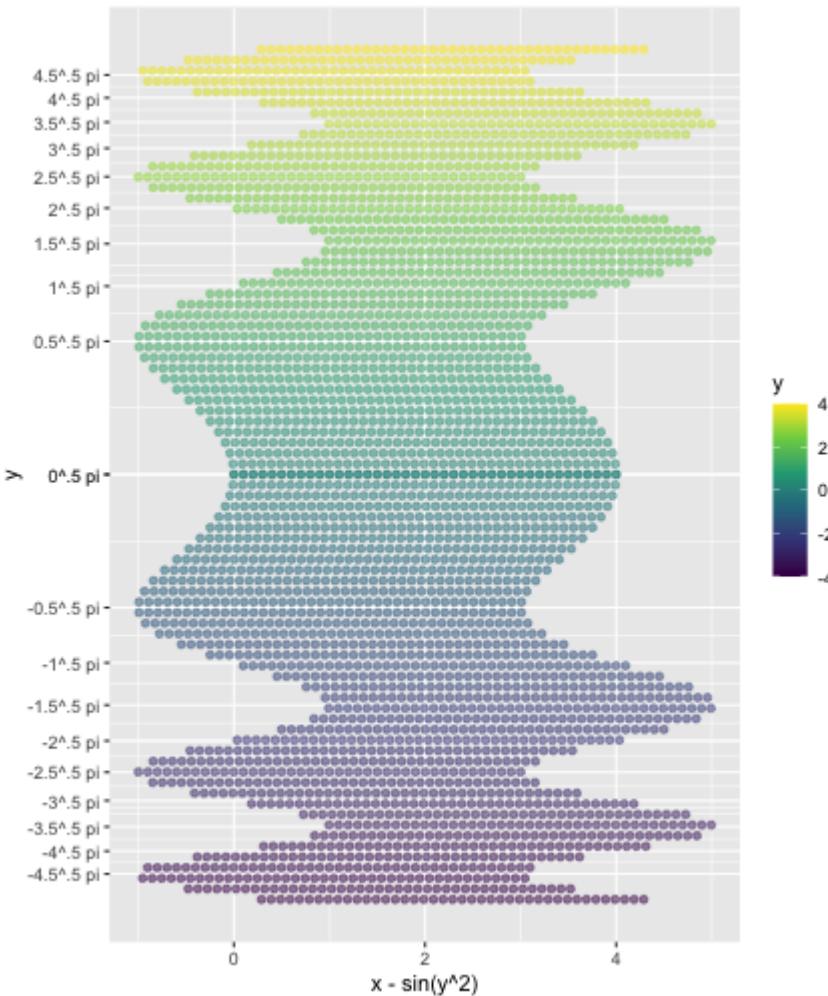


```

seq(0, 4, by = .1) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .5) +
  aes(color = y) +
  scale_color_viridis_c() +
  aes(x = x - sin(y)) +
  scale_y_continuous(
    breaks = -2:2/2*pi,
    labels = paste(-2:2/2, "pi")
  ) +
# where waves are accelerating
  aes(x = x - sin(y^2)) +
  scale_y_continuous(breaks = c((0:9/2*pi)^.5,
                                labels = paste0(c((0:9/2
# and reflected over y = 0
  geom_point(
    data = . %>% mutate(y = -y),
    alpha = .5)

```



```
seq(0, 4, by = .1) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .5) +
  aes(color = y) +
  scale_color_viridis_c() +
  aes(x = x - sin(y)) +
  scale_y_continuous(
    breaks = -2:2/2*pi,
    labels = paste(-2:2/2, "pi")
  ) +
# where waves are accelerating
  aes(x = x - sin(y^2)) +
  scale_y_continuous(breaks = c((0:9/2*pi)^.5,
                                labels = paste0(c((0:9/2)
# and reflected over y = 0
  geom_point(
    data = . %>% mutate(y = -y),
    alpha = .5) ->
  x_offset_determined_by_y
```

Now the y position.

the y grid position is offset ...

- into a wave based on the cosine of x

Now the y position.

the y grid position is offset ...

- into a wave based on the cosine of x
- and the waves accelerate moving away from $x = 0$ (so we actually use x^2)

Now the y position.

the y grid position is offset ...

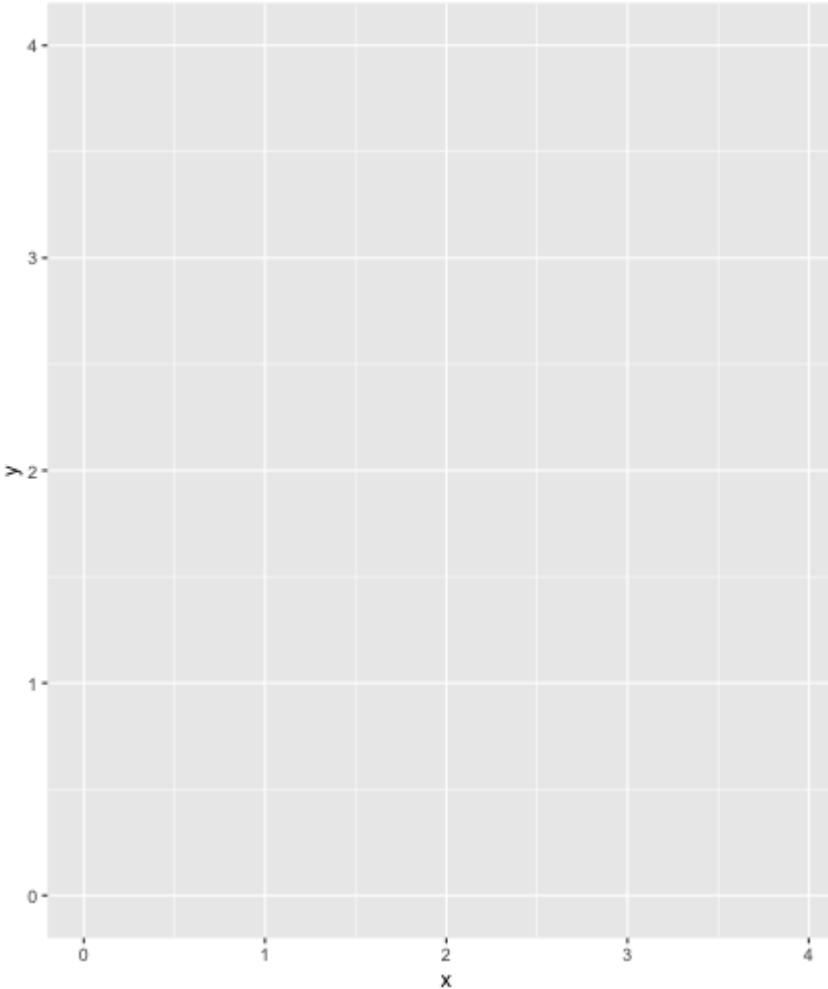
- into a wave based on the cosine of x
- and the waves accelerate moving away from $x = 0$ (so we actually use x^2)
- and the pattern is reflected across $x = 0$


```
tibble(x = my_seq) %>%  
  crossing(y = my_seq)
```

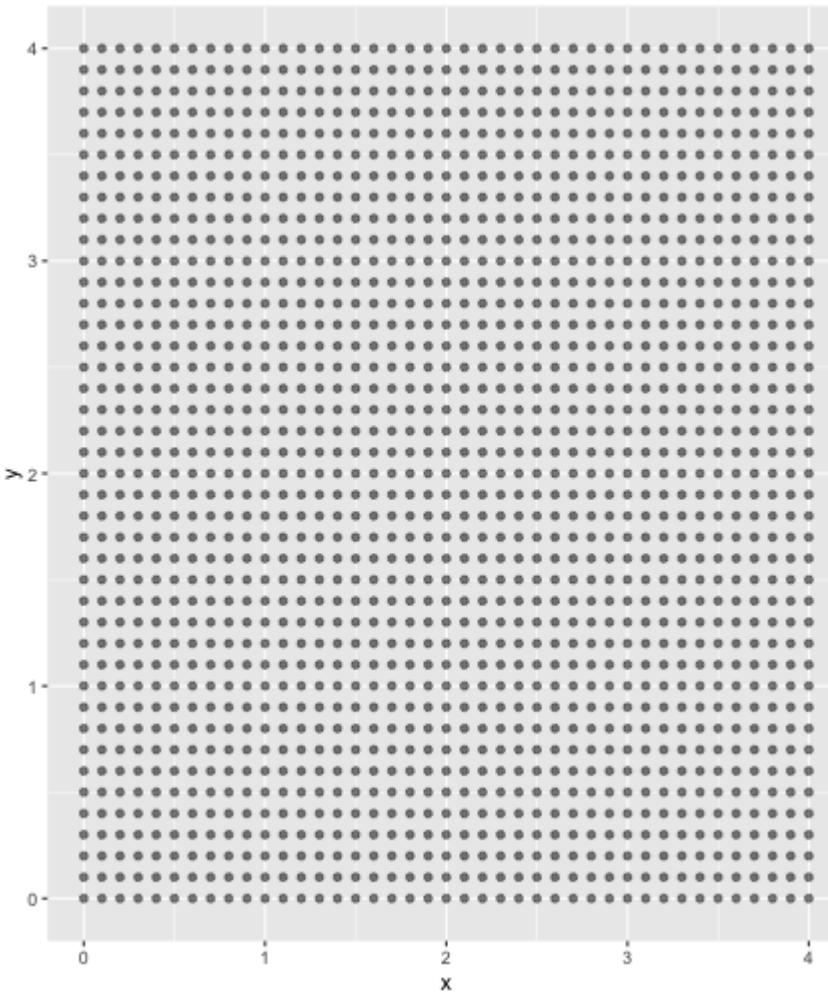
	x	y
	<dbl>	<dbl>
1	0	0
2	0	0.1
3	0	0.2
4	0	0.3
5	0	0.4
6	0	0.5
7	0	0.6
8	0	0.7
9	0	0.8
10	0	0.9
	# ... with 1,671 more rows	

```
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot()
```

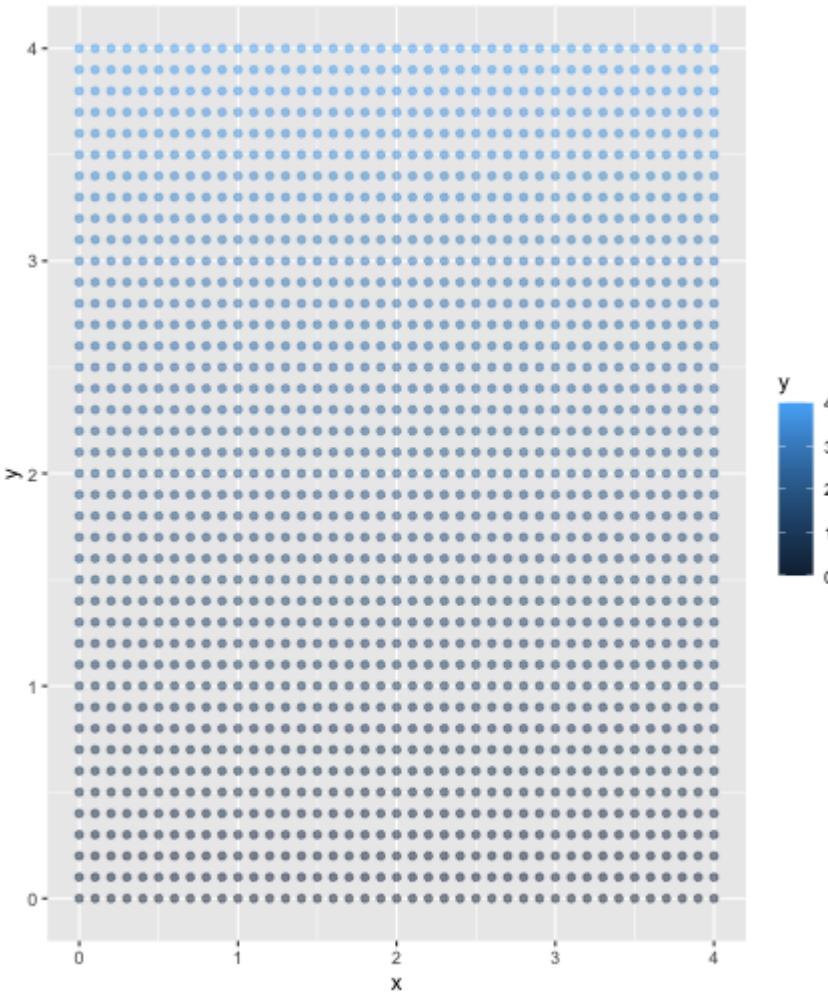
```
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot() +  
    aes(x = x,  
        y = y)
```



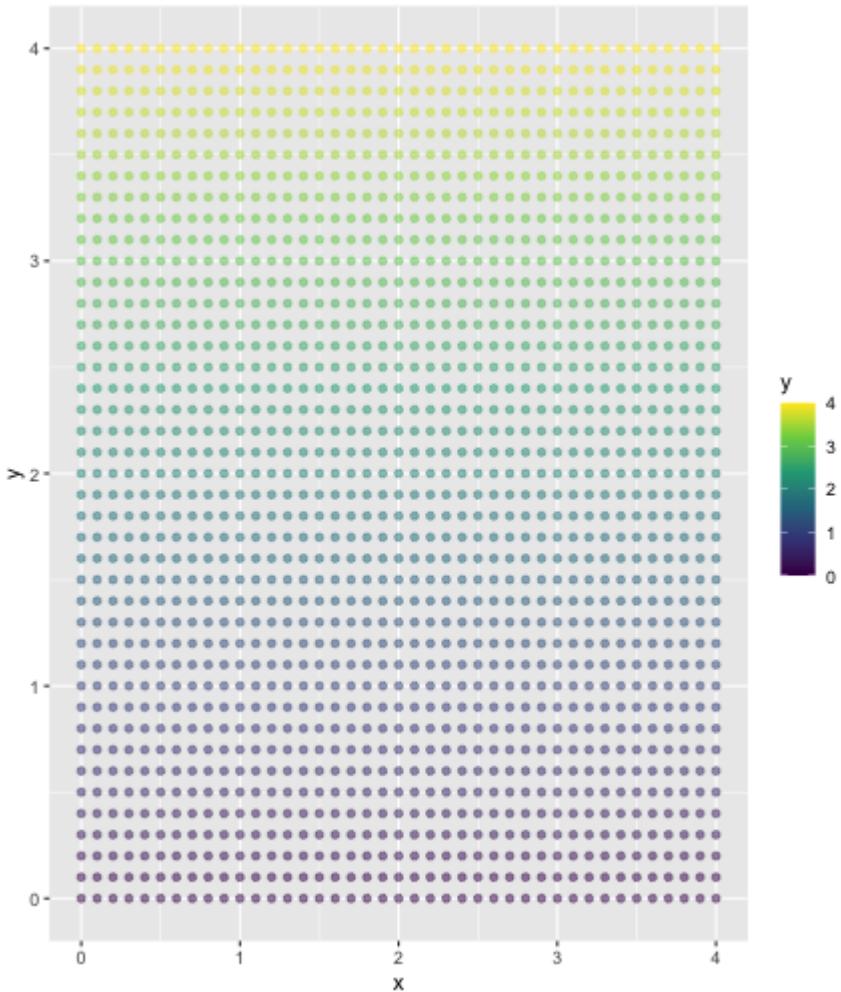
```
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot() +  
  aes(x = x,  
      y = y) +  
  geom_point(alpha = .5)
```



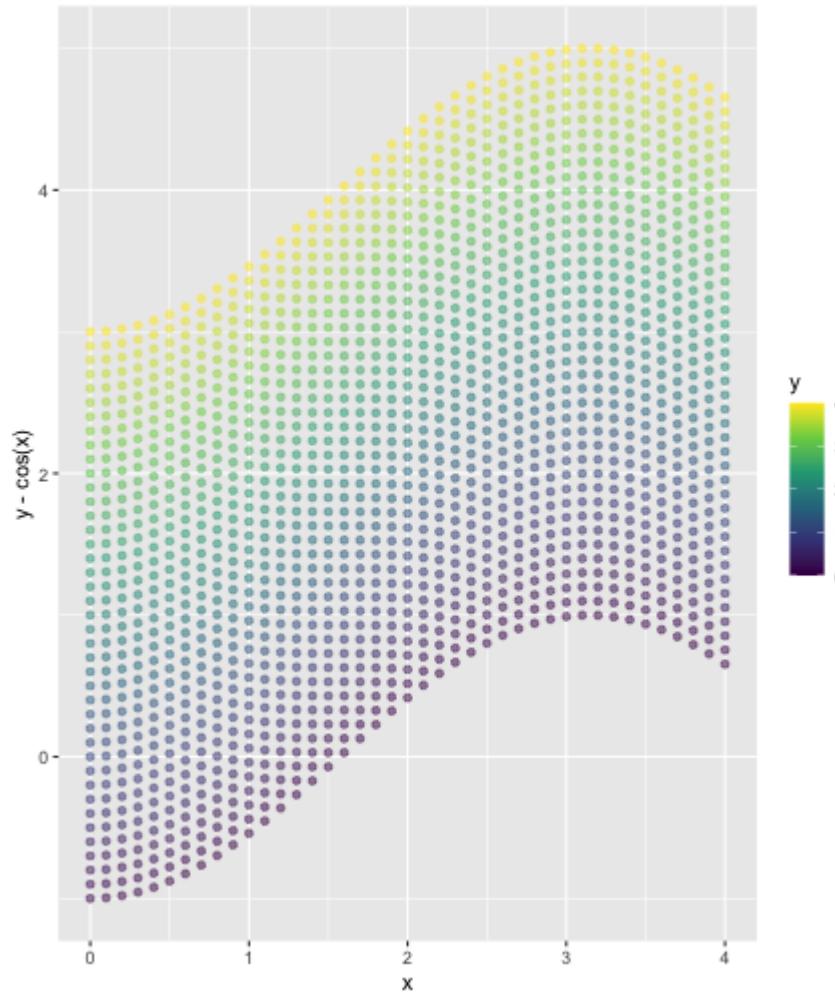
```
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot() +  
  aes(x = x,  
      y = y) +  
  geom_point(alpha = .5) +  
  aes(color = y)
```



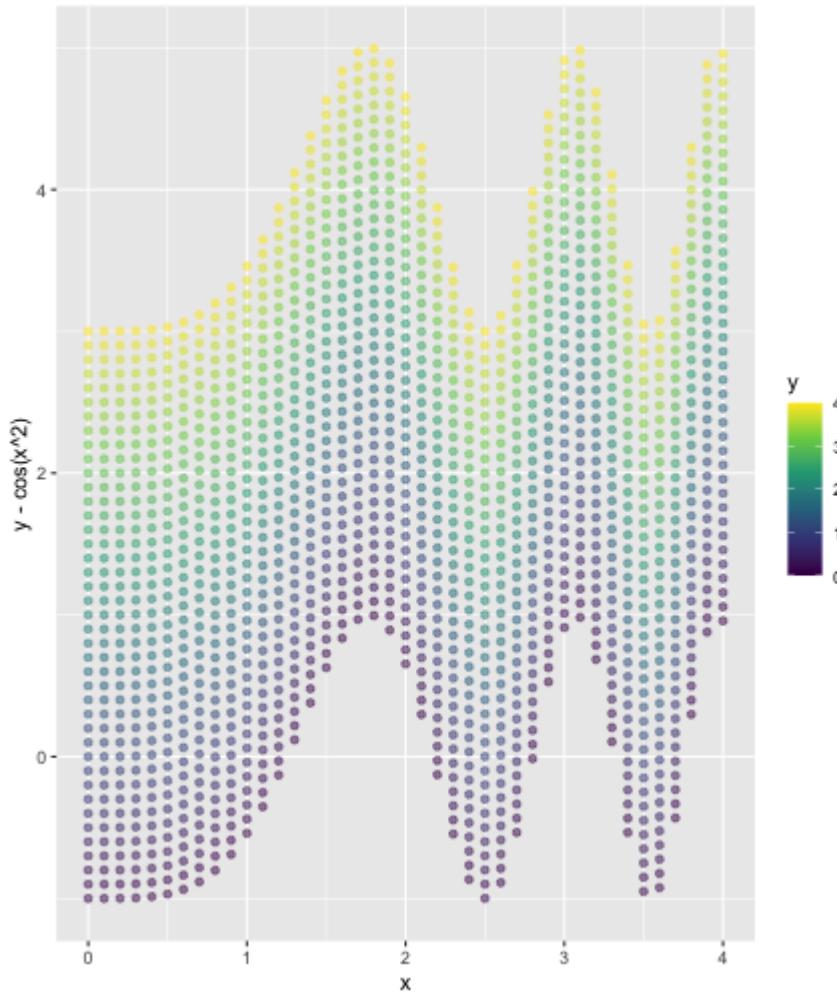
```
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot() +  
  aes(x = x,  
      y = y) +  
  geom_point(alpha = .5) +  
  aes(color = y) +  
  scale_color_viridis_c()
```



```
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot() +  
  aes(x = x,  
      y = y) +  
  geom_point(alpha = .5) +  
  aes(color = y) +  
  scale_color_viridis_c() +  
  aes(y = y - cos(x))
```



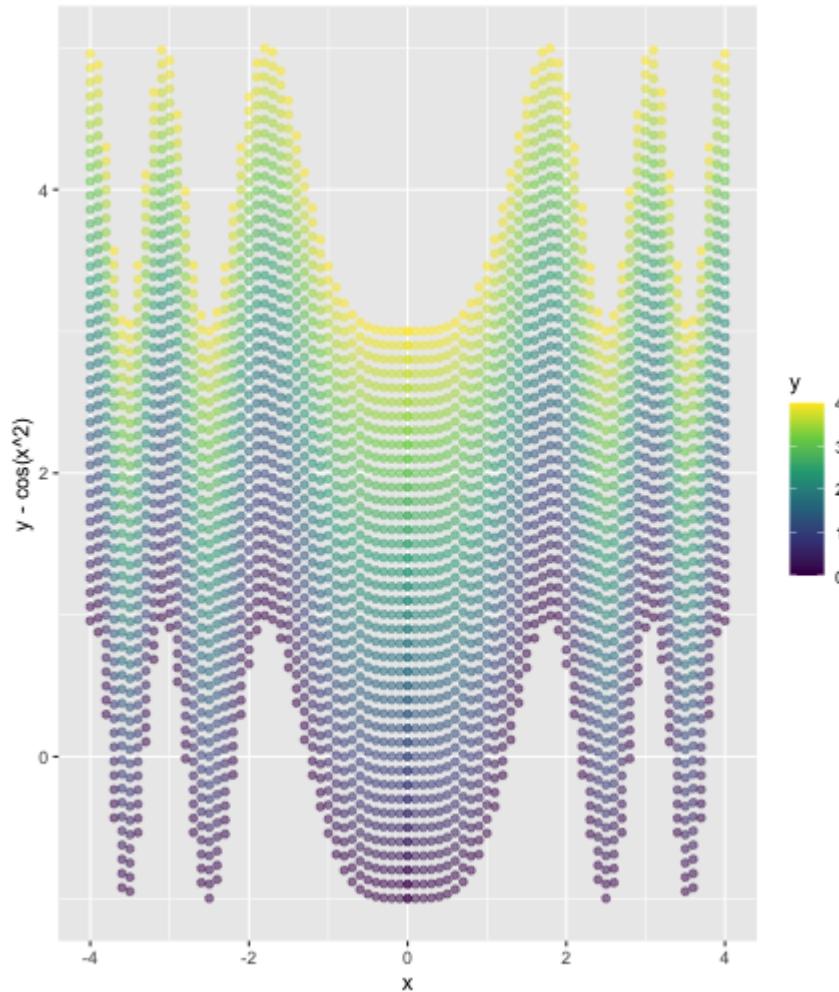
```
tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .5) +
  aes(color = y) +
  scale_color_viridis_c() +
  aes(y = y - cos(x)) +
# where waves are accelerating
  aes(y = y - cos(x^2))
```



```

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .5) +
  aes(color = y) +
  scale_color_viridis_c() +
  aes(y = y - cos(x)) +
# where waves are accelerating
  aes(y = y - cos(x^2)) +
# and reflected over y = 0
  geom_point(
    data = . %>% mutate(x = -x),
    alpha = .5)

```



```
tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .5) +
  aes(color = y) +
  scale_color_viridis_c() +
  aes(y = y - cos(x)) +
# where waves are accelerating
  aes(y = y - cos(x^2)) +
# and reflected over y = 0
  geom_point(
    data = . %>% mutate(x = -x),
    alpha = .5) ->
y_offset_determined_by_x
```

putting it all together

putting it all together

- let's see the evolution of both both sets of offsets...

putting it all together

- let's see the evolution of both both sets of offsets...
- we also let the squaring handle the symmetry across the x and y axes (the sequence goes from -3 to positive 3)

putting it all together

- let's see the evolution of both both sets of offsets...
- we also let the squaring handle the symmetry across the x and y axes (the sequence goes from -3 to positive 3)

```
seq(-4, 4, by = .1)
```

```
[1] -4.0 -3.9 -3.8 -3.7 -3.6 -3.5 -3.4 -3.3 -3.2 -3.1 -3.0 -2.9 -2.8 -2.7 -2.6  
[16] -2.5 -2.4 -2.3 -2.2 -2.1 -2.0 -1.9 -1.8 -1.7 -1.6 -1.5 -1.4 -1.3 -1.2 -1.1  
[31] -1.0 -0.9 -0.8 -0.7 -0.6 -0.5 -0.4 -0.3 -0.2 -0.1  0.0  0.1  0.2  0.3  0.4  
[46]  0.5  0.6  0.7  0.8  0.9  1.0  1.1  1.2  1.3  1.4  1.5  1.6  1.7  1.8  1.9  
[61]  2.0  2.1  2.2  2.3  2.4  2.5  2.6  2.7  2.8  2.9  3.0  3.1  3.2  3.3  3.4  
[76]  3.5  3.6  3.7  3.8  3.9  4.0
```

```
seq(-4, 4, by = .1) ->  
my_seq
```

```
seq(-4, 4, by = .1) ->  
my_seq  
tibble(x = my_seq)
```

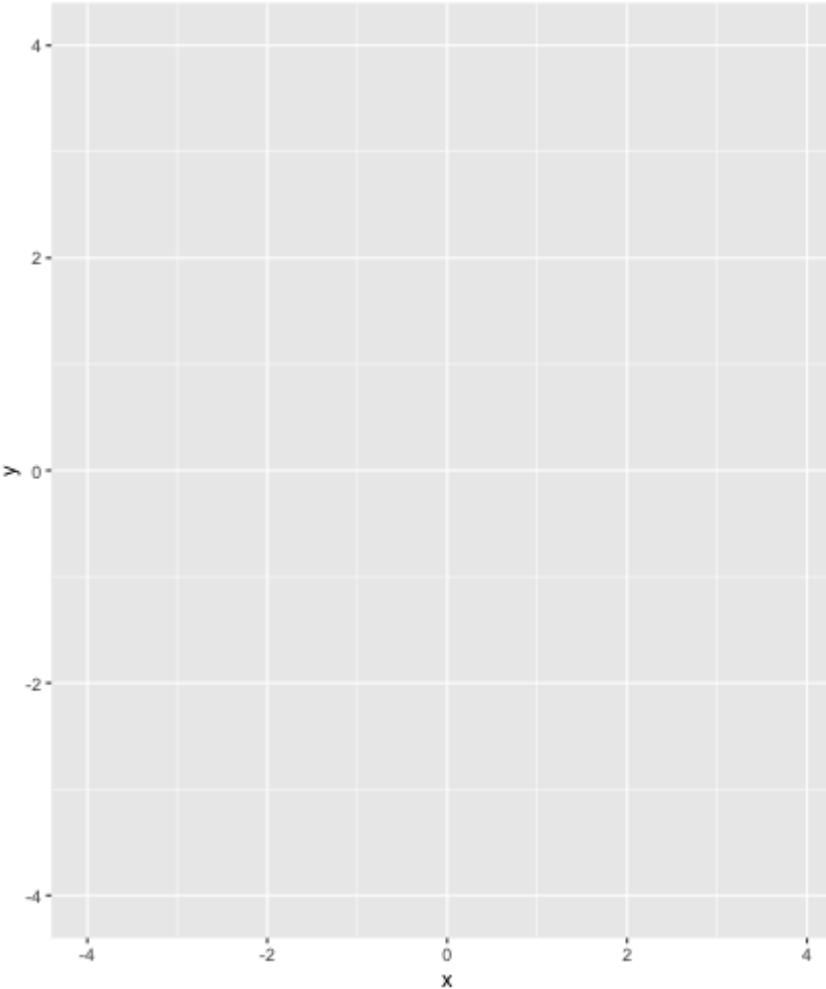
```
# A tibble: 81 x 1  
      x  
   <dbl>  
1    -4  
2   -3.9  
3   -3.8  
4   -3.7  
5   -3.6  
6   -3.5  
7   -3.4  
8   -3.3  
9   -3.2  
10  -3.1  
# ... with 71 more rows
```

```
seq(-4, 4, by = .1) ->  
my_seq  
tibble(x = my_seq) %>%  
crossing(y = my_seq)
```

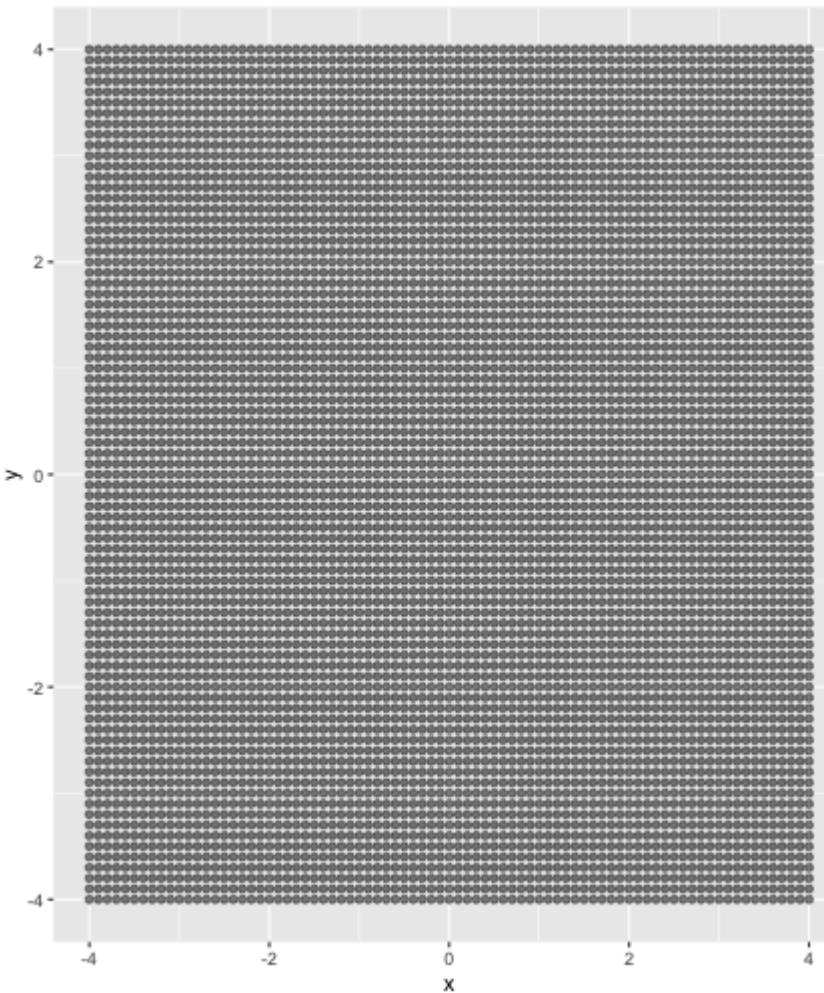
```
# A tibble: 6,561 x 2  
      x     y  
  <dbl> <dbl>  
1    -4    -4  
2    -4   -3.9  
3    -4   -3.8  
4    -4   -3.7  
5    -4   -3.6  
6    -4   -3.5  
7    -4   -3.4  
8    -4   -3.3  
9    -4   -3.2  
10   -4   -3.1  
# ... with 6,551 more rows
```

```
seq(-4, 4, by = .1) ->  
my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot()
```

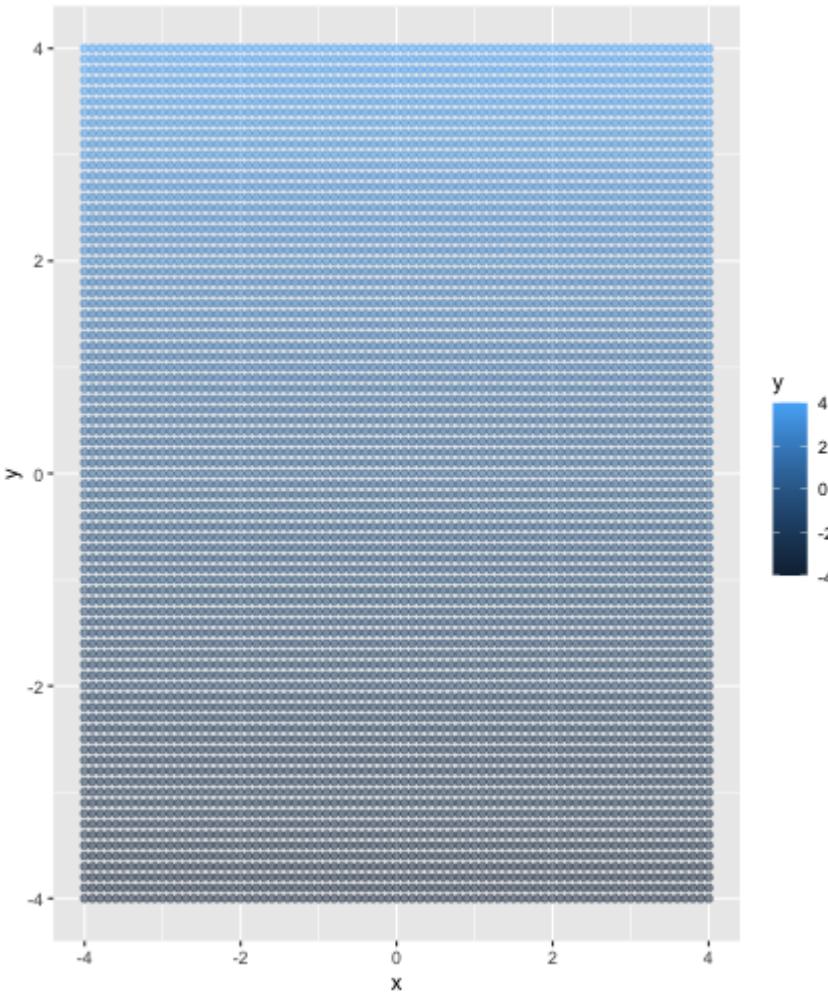
```
seq(-4, 4, by = .1) ->  
my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot() +  
    aes(x = x,  
        y = y)
```



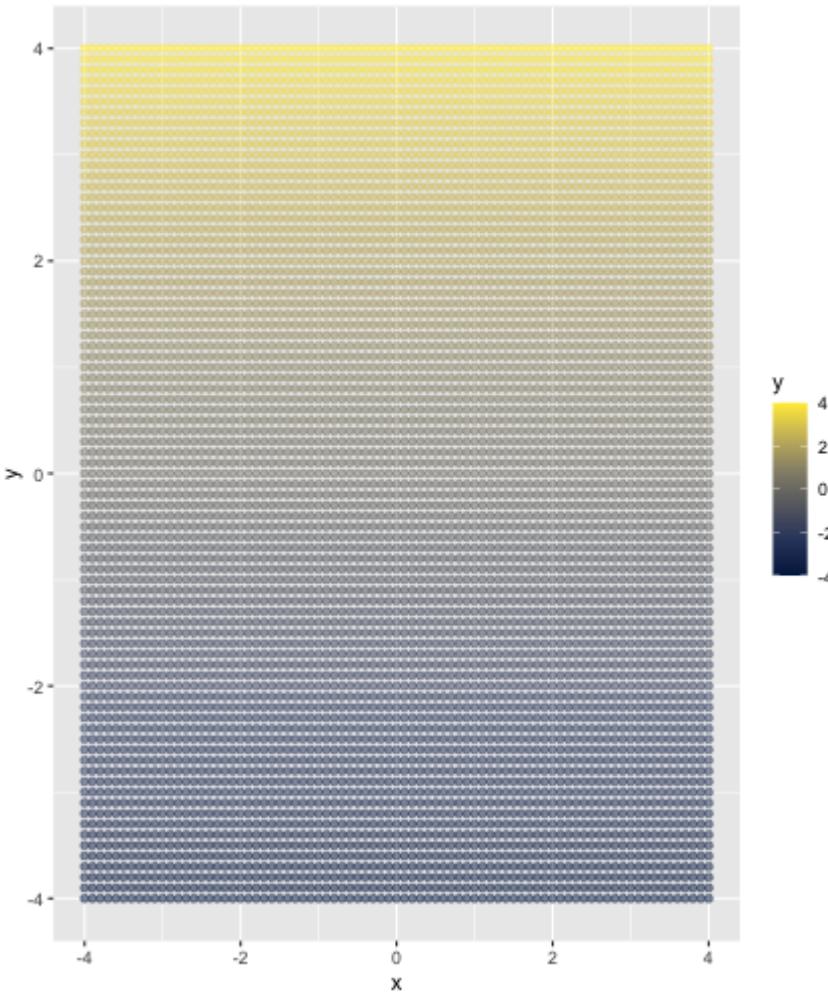
```
seq(-4, 4, by = .1) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x,  
y = y) +  
geom_point(alpha = .5)
```



```
seq(-4, 4, by = .1) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x,  
y = y) +  
geom_point(alpha = .5) +  
aes(color = y)
```



```
seq(-4, 4, by = .1) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x,  
y = y) +  
geom_point(alpha = .5) +  
aes(color = y) +  
scale_color_viridis_c(option = "cividis")
```

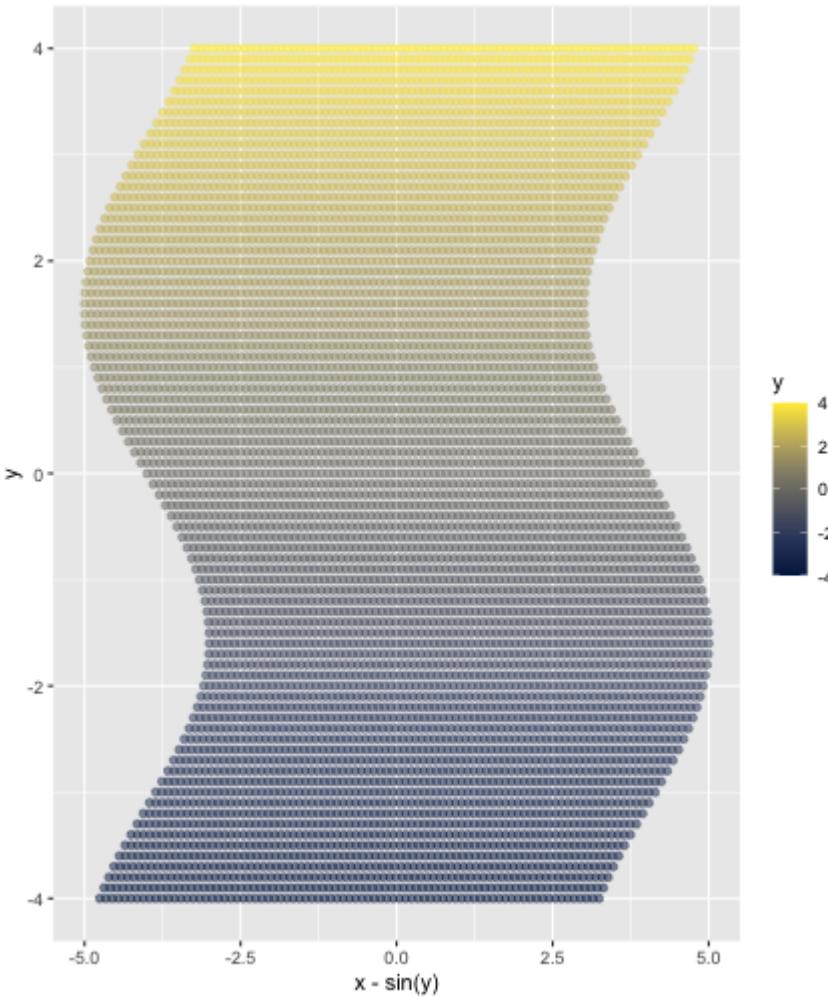


```

seq(-4, 4, by = .1) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .5) +
  aes(color = y) +
  scale_color_viridis_c(option = "cividis") +
# offset of x is determined by sin of y
  aes(x = x - sin(y))

```

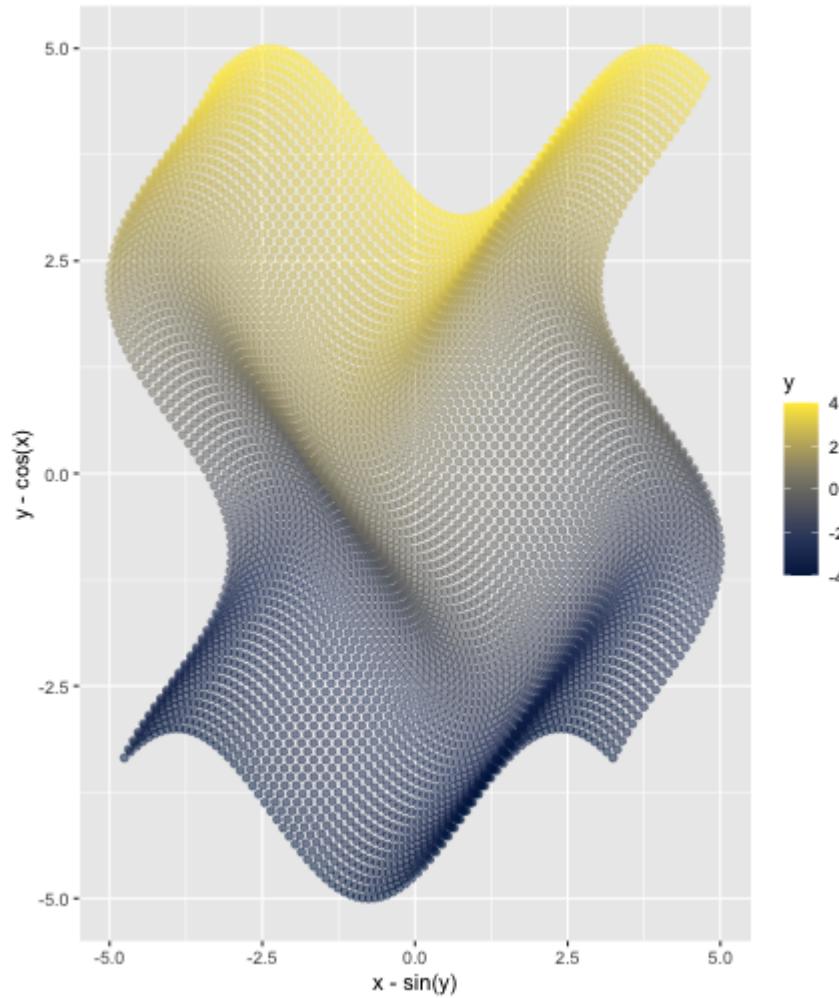


```

seq(-4, 4, by = .1) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .5) +
  aes(color = y) +
  scale_color_viridis_c(option = "cividis") +
# offset of x is determined by sin of y
  aes(x = x - sin(y)) +
# offset of y is determined by cos of x
  aes(y = y - cos(x))

```

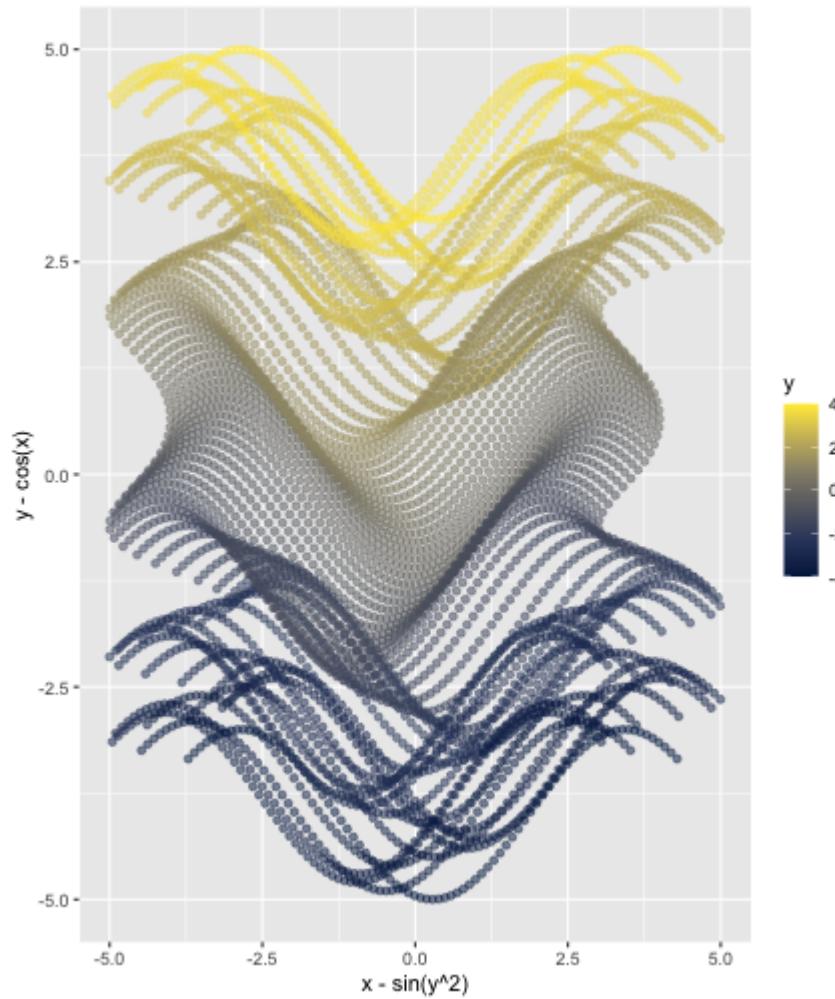


```

seq(-4, 4, by = .1) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .5) +
  aes(color = y) +
  scale_color_viridis_c(option = "cividis") +
# offset of x is determined by sin of y
  aes(x = x - sin(y)) +
# offset of y is determined by cos of x
  aes(y = y - cos(x)) +
# and waves are accelerating
# moving away from zero so use squared value
  aes(x = x - sin(y^2))

```

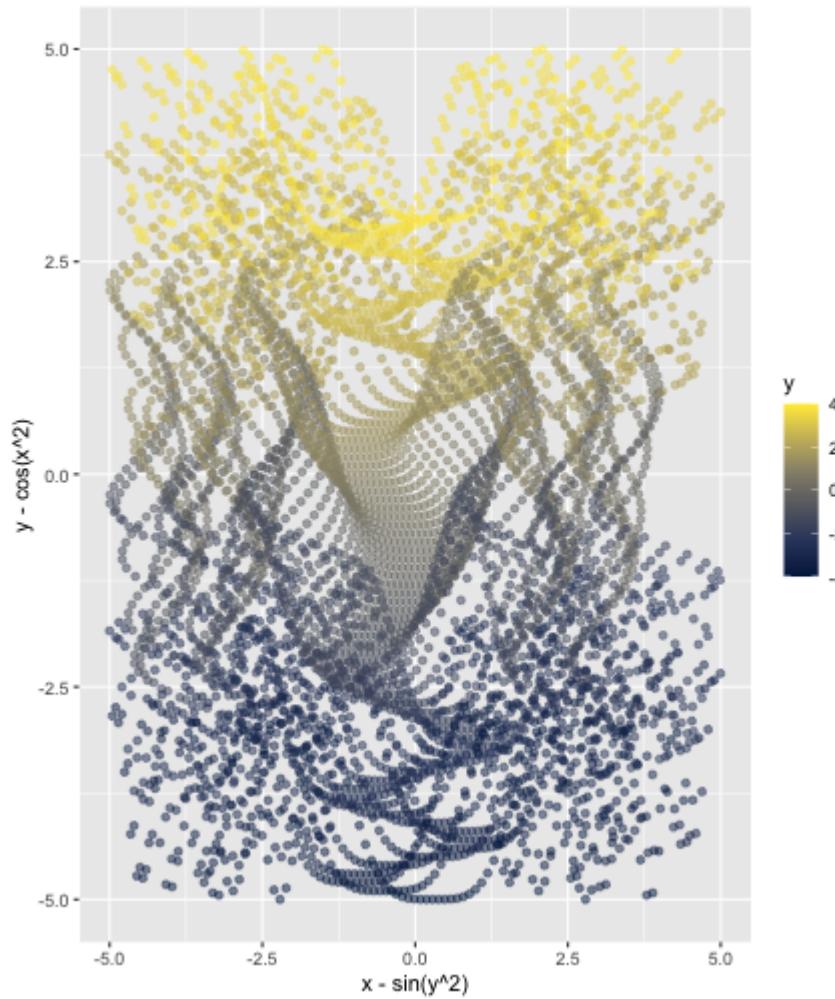


```

seq(-4, 4, by = .1) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .5) +
  aes(color = y) +
  scale_color_viridis_c(option = "cividis") +
# offset of x is determined by sin of y
  aes(x = x - sin(y)) +
# offset of y is determined by cos of x
  aes(y = y - cos(x)) +
# and waves are accelerating
# moving away from zero so use squared value
  aes(x = x - sin(y^2)) +
  aes(y = y - cos(x^2))

```



```

seq(-4, 4, by = .1) ->
  my_seq

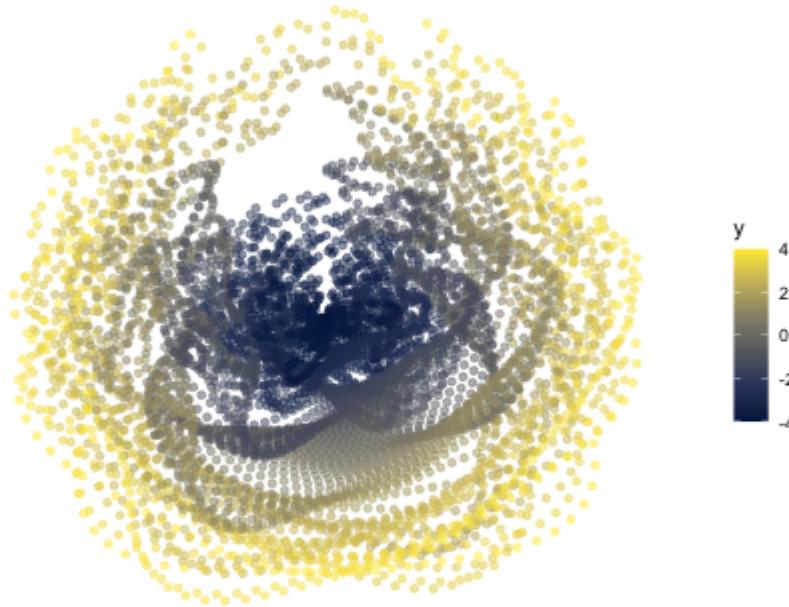
tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .5) +
  aes(color = y) +
  scale_color_viridis_c(option = "cividis") +
# offset of x is determined by sin of y
  aes(x = x - sin(y)) +
# offset of y is determined by cos of x
  aes(y = y - cos(x)) +
# and waves are accelerating
# moving away from zero so use squared value
  aes(x = x - sin(y^2)) +
  aes(y = y - cos(x^2)) +
  theme_void()

```



```
seq(-4, 4, by = .1) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .5) +
  aes(color = y) +
  scale_color_viridis_c(option = "cividis") +
# offset of x is determined by sin of y
  aes(x = x - sin(y)) +
# offset of y is determined by cos of x
  aes(y = y - cos(x)) +
# and waves are accelerating
# moving away from zero so use squared value
  aes(x = x - sin(y^2)) +
  aes(y = y - cos(x^2)) +
  theme_void() +
  coord_polar()
```



Higher resolution is a lot prettier

Higher resolution is a lot prettier

- grid points are closer together and smaller

Higher resolution is a lot prettier

- grid points are closer together and smaller
- patterns are clearer in less dense regions

Higher resolution is a lot prettier

- grid points are closer together and smaller
- patterns are clearer in less dense regions
- Also, I just do sequence from -3 to 3. This range be more classic, but I though from -4 to 4 showed wave 'acceleration' more clearly.

```
seq(-3, 3, by = .01) -> my_seq
```

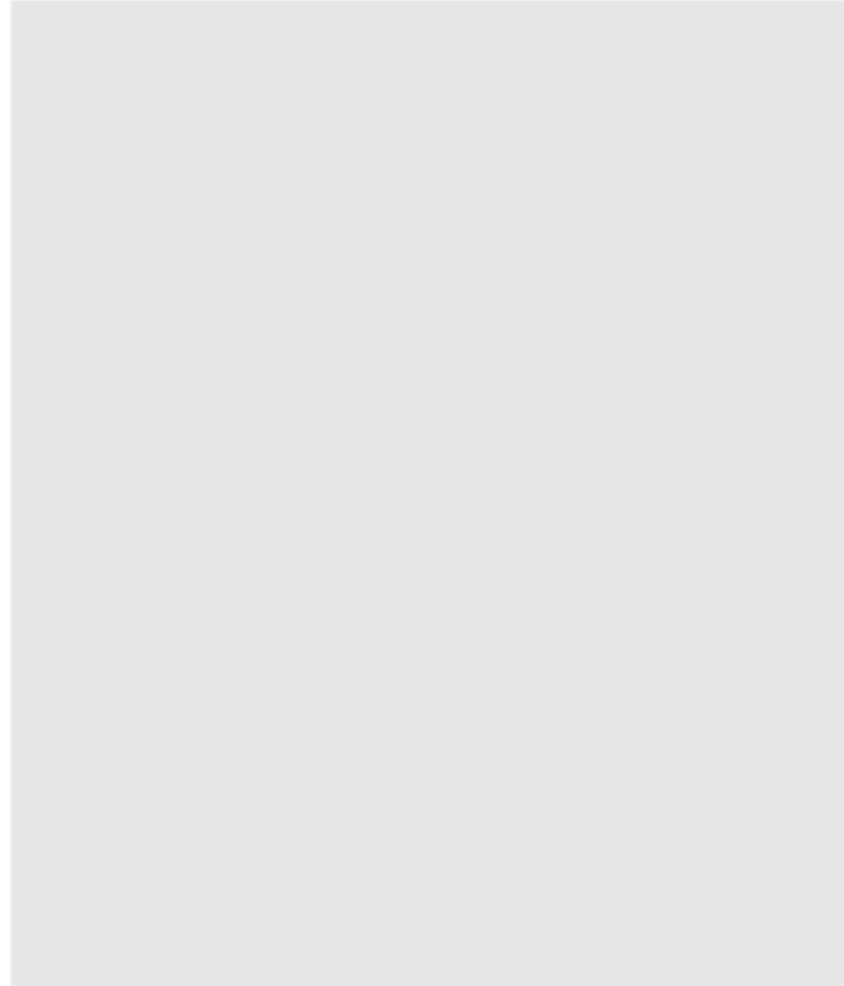
```
seq(-3, 3, by = .01) -> my_seq
tibble(x = my_seq)
```

```
# A tibble: 601 x 1
  x
  <dbl>
1 -3
2 -2.99
3 -2.98
4 -2.97
5 -2.96
6 -2.95
7 -2.94
8 -2.93
9 -2.92
10 -2.91
# ... with 591 more rows
```

```
seq(-3, 3, by = .01) -> my_seq
tibble(x = my_seq) %>%
  crossing(y = my_seq)
```

```
# A tibble: 361,201 x 2
      x     y
  <dbl> <dbl>
1    -3   -3
2    -3  -2.99
3    -3  -2.98
4    -3  -2.97
5    -3  -2.96
6    -3  -2.95
7    -3  -2.94
8    -3  -2.93
9    -3  -2.92
10   -3  -2.91
# ... with 361,191 more rows
```

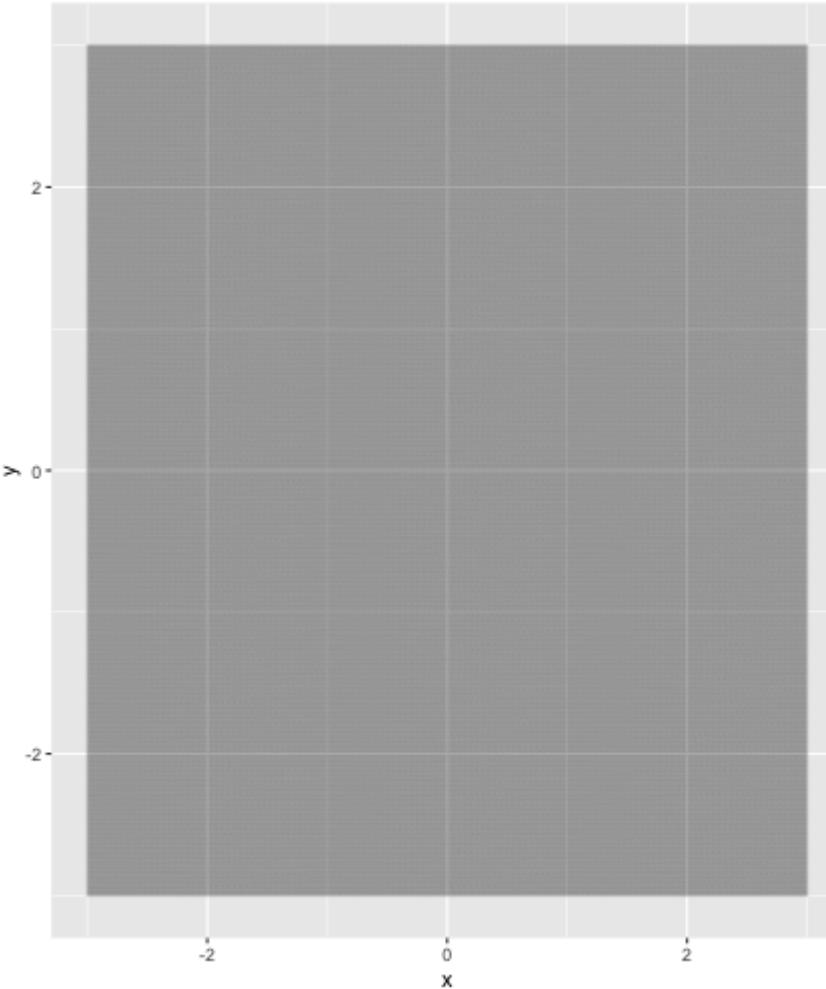
```
seq(-3, 3, by = .01) -> my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot()
```



```
seq(-3, 3, by = .01) -> my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot() +  
  aes(x = x,  
      y = y)
```

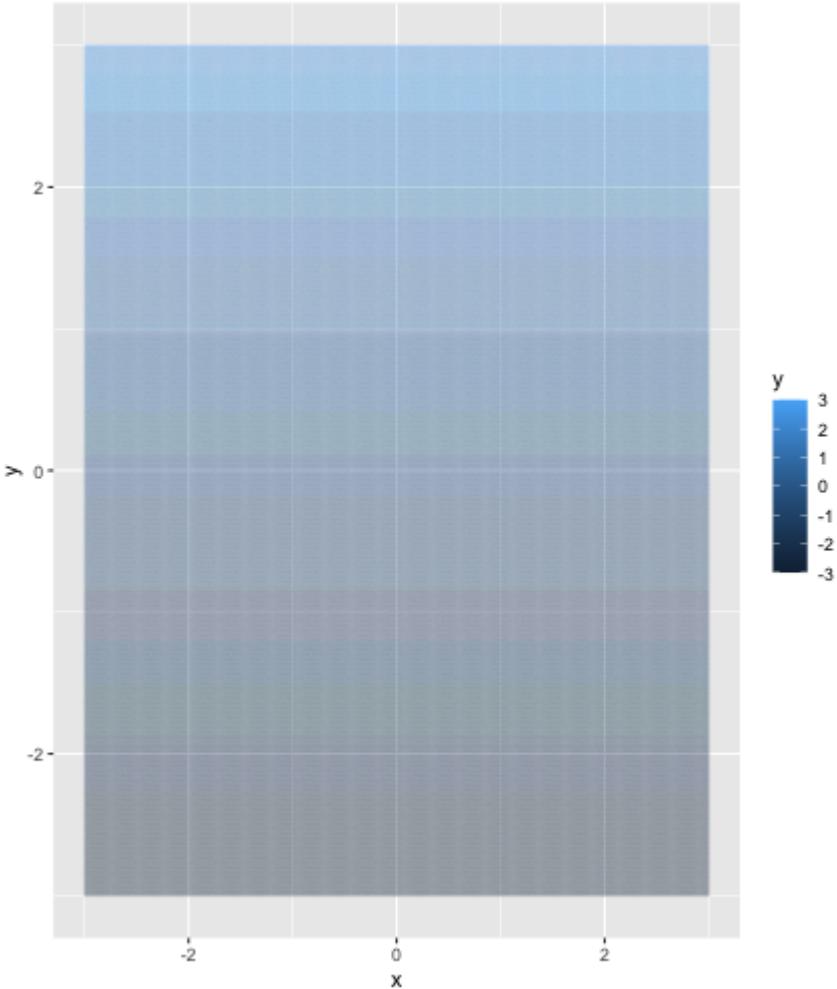


```
seq(-3, 3, by = .01) -> my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot() +  
  aes(x = x,  
      y = y) +  
  geom_point(alpha = .05, size = .05)
```



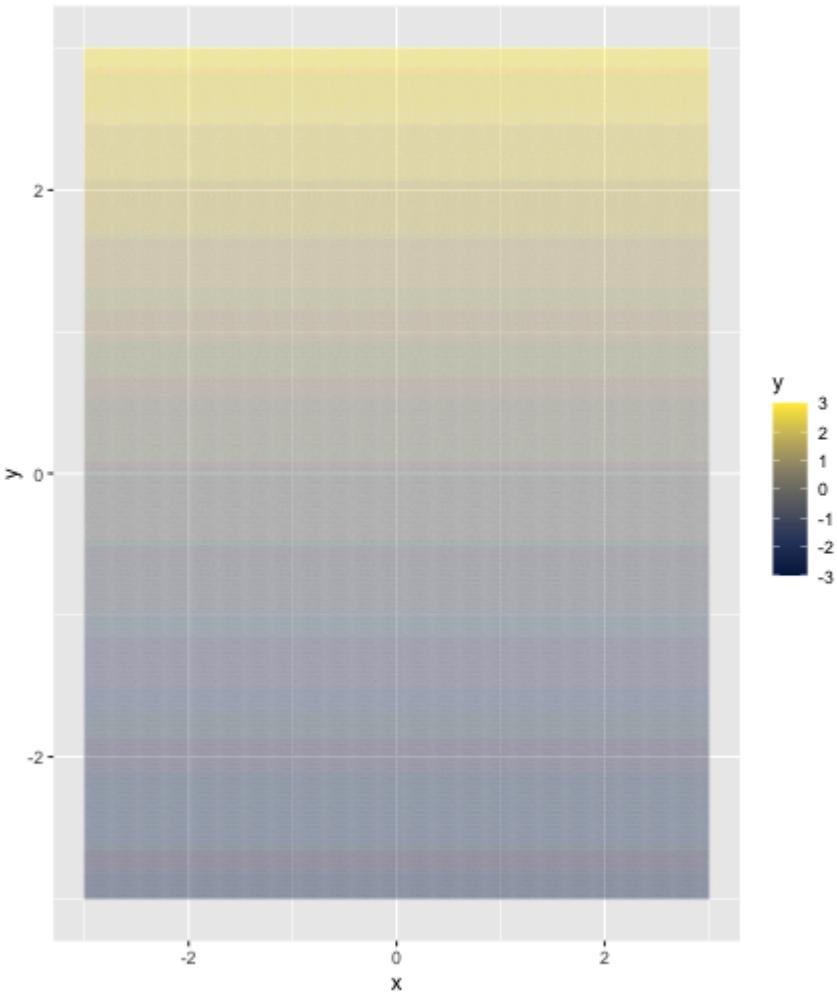
```
seq(-3, 3, by = .01) -> my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .05, size = .05) +
  aes(color = y)
```



```
seq(-3, 3, by = .01) -> my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .05, size = .05) +
  aes(color = y) +
  scale_color_viridis_c(option = "cividis")
```

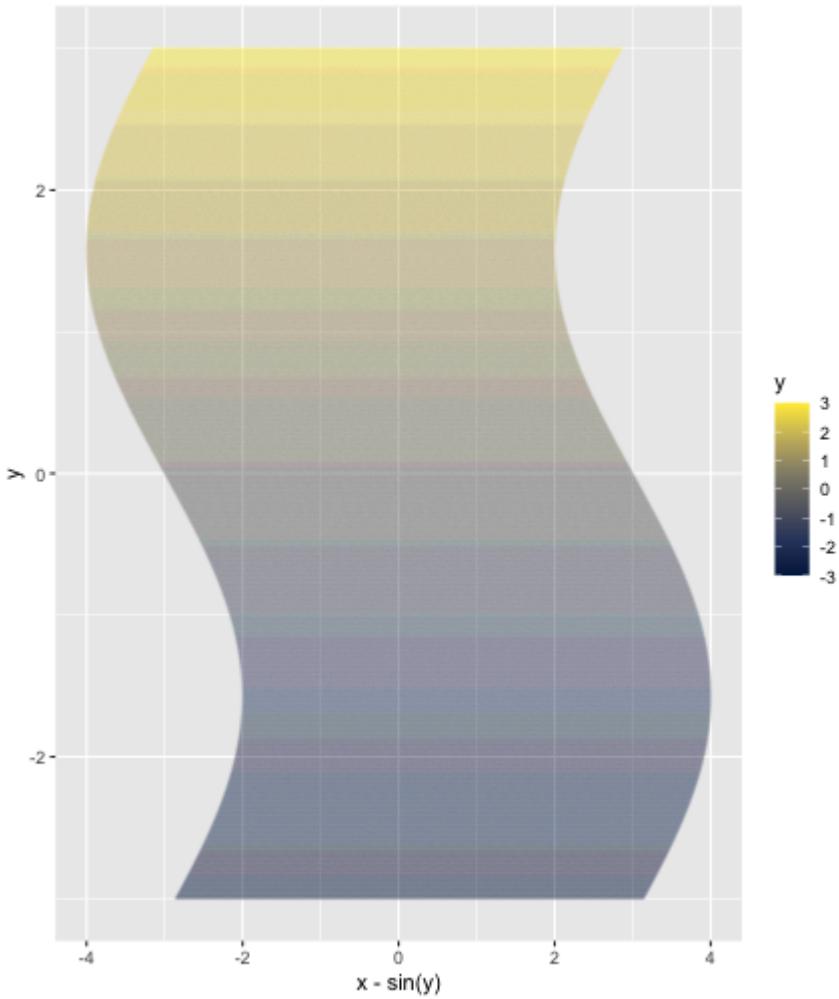


```

seq(-3, 3, by = .01) -> my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .05, size = .05) +
  aes(color = y) +
  scale_color_viridis_c(option = "cividis") +
# offset of x is determined by sin of y
  aes(x = x - sin(y))

```

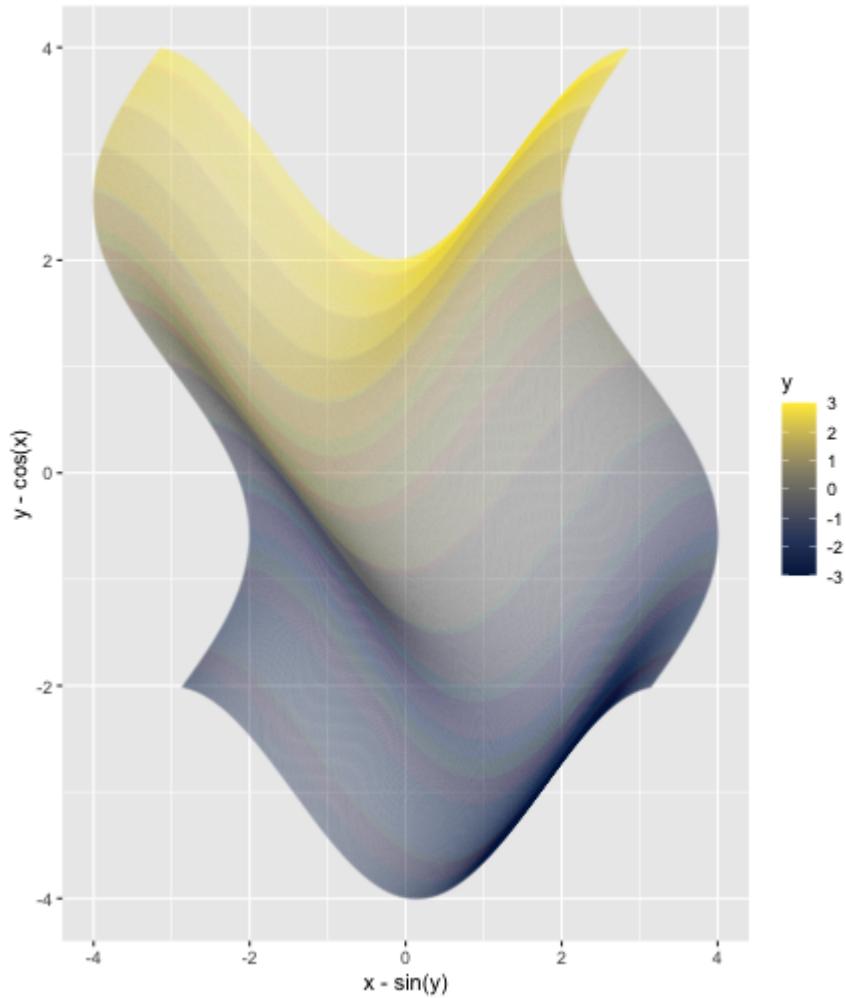


```

seq(-3, 3, by = .01) -> my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .05, size = .05) +
  aes(color = y) +
  scale_color_viridis_c(option = "cividis") +
# offset of x is determined by sin of y
  aes(x = x - sin(y)) +
# offset of y is determined by cos of x
  aes(y = y - cos(x))

```

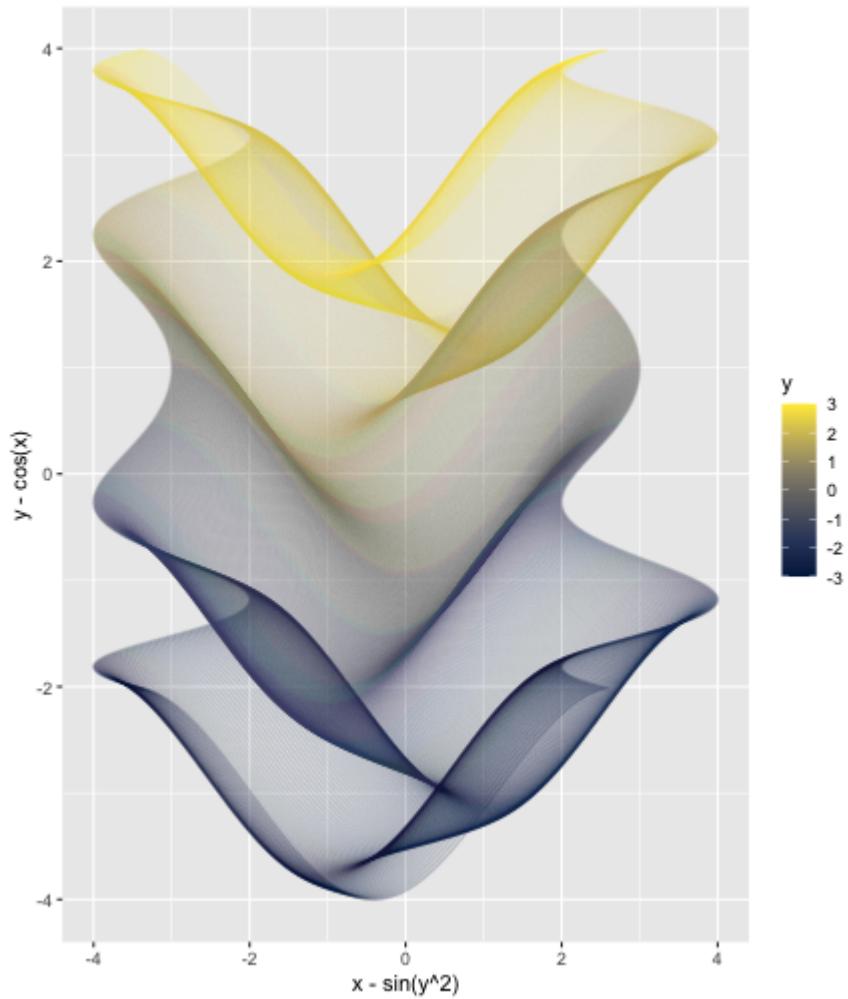


```

seq(-3, 3, by = .01) -> my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .05, size = .05) +
  aes(color = y) +
  scale_color_viridis_c(option = "cividis") +
# offset of x is determined by sin of y
  aes(x = x - sin(y)) +
# offset of y is determined by cos of x
  aes(y = y - cos(x)) +
# and waves are accelerating
# moving away from zero so use squared value
  aes(x = x - sin(y^2))

```

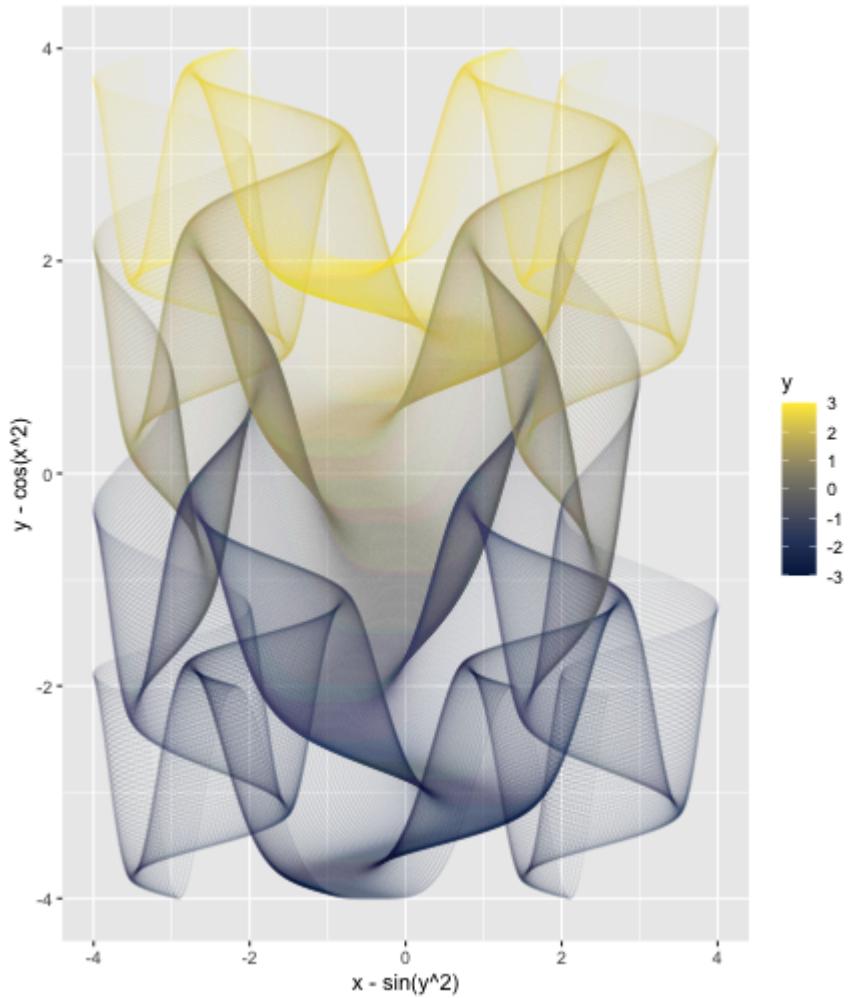


```

seq(-3, 3, by = .01) -> my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .05, size = .05) +
  aes(color = y) +
  scale_color_viridis_c(option = "cividis") +
# offset of x is determined by sin of y
  aes(x = x - sin(y)) +
# offset of y is determined by cos of x
  aes(y = y - cos(x)) +
# and waves are accelerating
# moving away from zero so use squared value
  aes(x = x - sin(y^2)) +
  aes(y = y - cos(x^2))

```

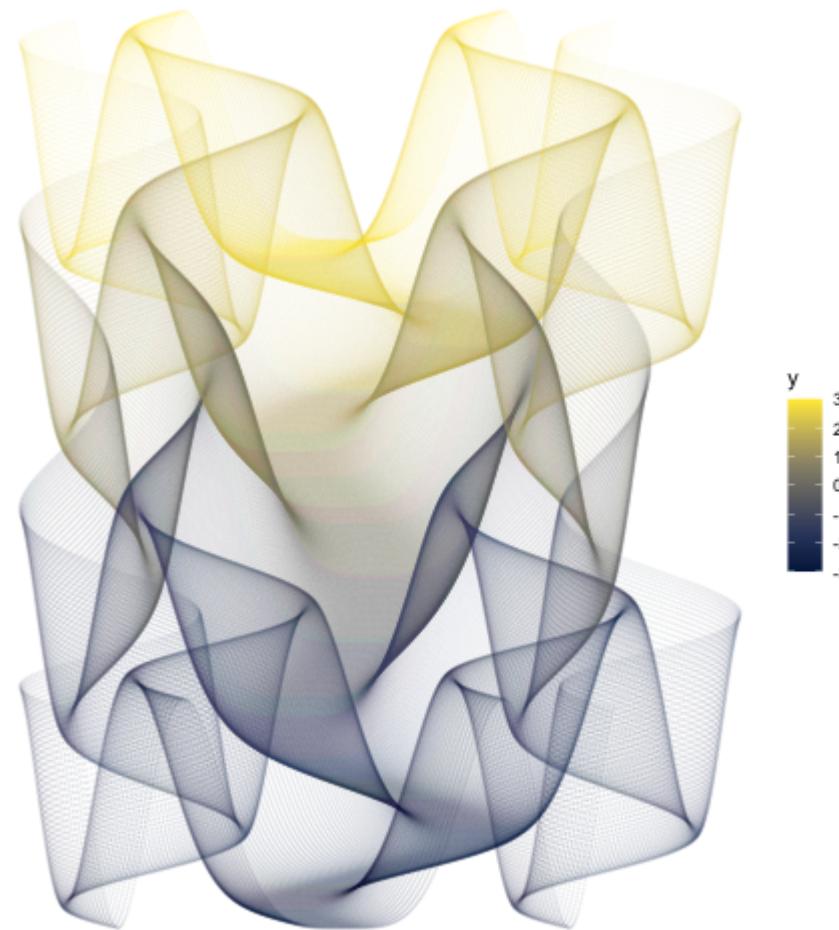


```

seq(-3, 3, by = .01) -> my_seq

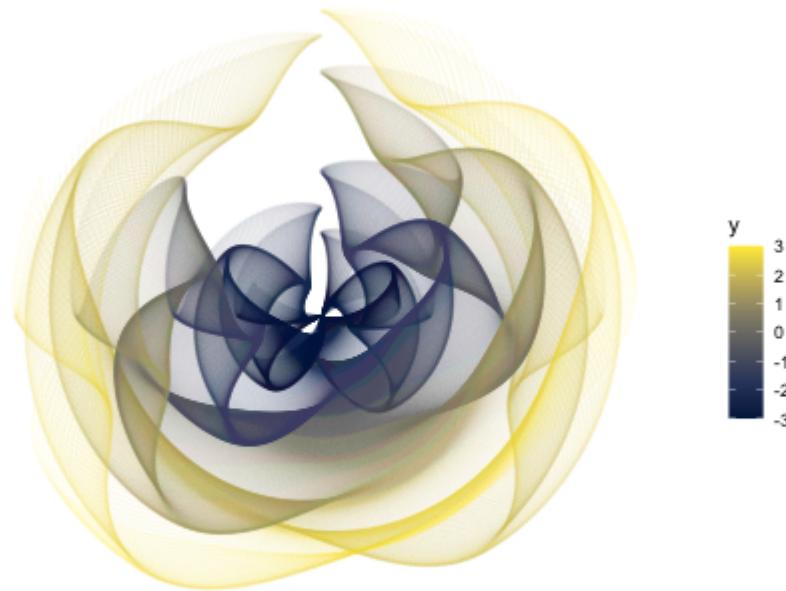
tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .05, size = .05) +
  aes(color = y) +
  scale_color_viridis_c(option = "cividis") +
# offset of x is determined by sin of y
  aes(x = x - sin(y)) +
# offset of y is determined by cos of x
  aes(y = y - cos(x)) +
# and waves are accelerating
# moving away from zero so use squared value
  aes(x = x - sin(y^2)) +
  aes(y = y - cos(x^2)) +
  theme_void()

```



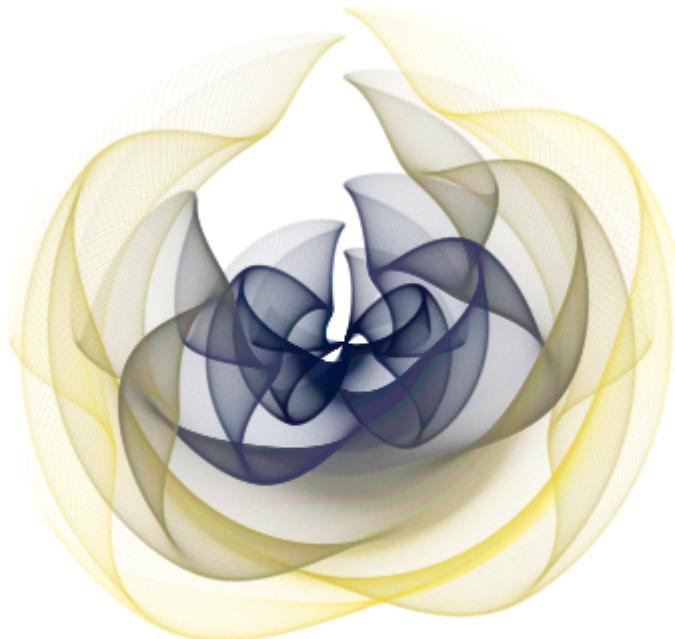
```
seq(-3, 3, by = .01) -> my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .05, size = .05) +
  aes(color = y) +
  scale_color_viridis_c(option = "cividis") +
# offset of x is determined by sin of y
  aes(x = x - sin(y)) +
# offset of y is determined by cos of x
  aes(y = y - cos(x)) +
# and waves are accelerating
# moving away from zero so use squared value
  aes(x = x - sin(y^2)) +
  aes(y = y - cos(x^2)) +
  theme_void() +
  coord_polar()
```



```
seq(-3, 3, by = .01) -> my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .05, size = .05) +
  aes(color = y) +
  scale_color_viridis_c(option = "cividis") +
# offset of x is determined by sin of y
  aes(x = x - sin(y)) +
# offset of y is determined by cos of x
  aes(y = y - cos(x)) +
# and waves are accelerating
# moving away from zero so use squared value
  aes(x = x - sin(y^2)) +
  aes(y = y - cos(x^2)) +
  theme_void() +
  coord_polar() +
  theme(legend.position = "none")
```



Try stuff and see what happens.

Try stuff and see what happens.

We can also look at deceleration of waves away from zero and slower accelerations

Try stuff and see what happens.

We can also look at deceleration of waves away from zero and slower accelerations

- squaring is a special case that gives us reflection automatically

Try stuff and see what happens.

We can also look at deceleration of waves away from zero and slower accelerations

- squaring is a special case that gives us reflection automatically
- we'll get irrational numbers if we raise negative numbers to decimals

Try stuff and see what happens.

We can also look at deceleration of waves away from zero and slower accelerations

- squaring is a special case that gives us reflection automatically
- we'll get irrational numbers if we raise negative numbers to decimals
- so we take absolute value first

Try stuff and see what happens.

We can also look at deceleration of waves away from zero and slower accelerations

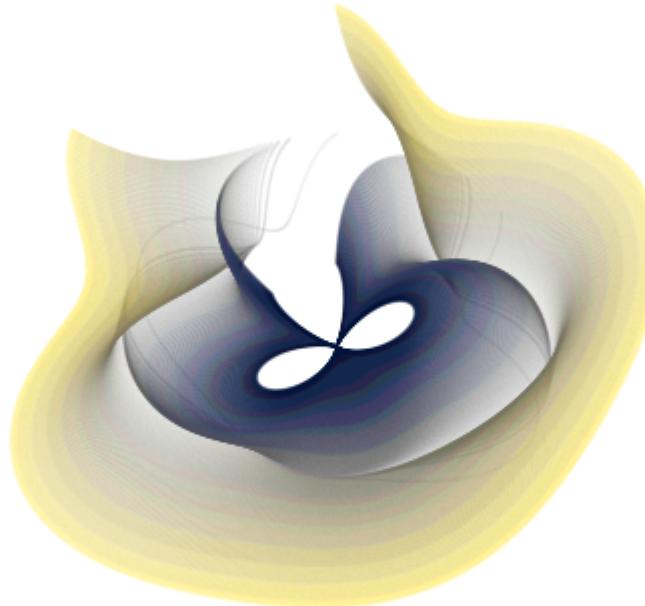
- squaring is a special case that gives us reflection automatically
- we'll get irrational numbers if we raise negative numbers to decimals
- so we take absolute value first
- we'll only adjust the value of x based on the sin of the absolute value of y to some power (between .3 to 1.9)

```

seq(-3, 3, by = .01) -> my_seq

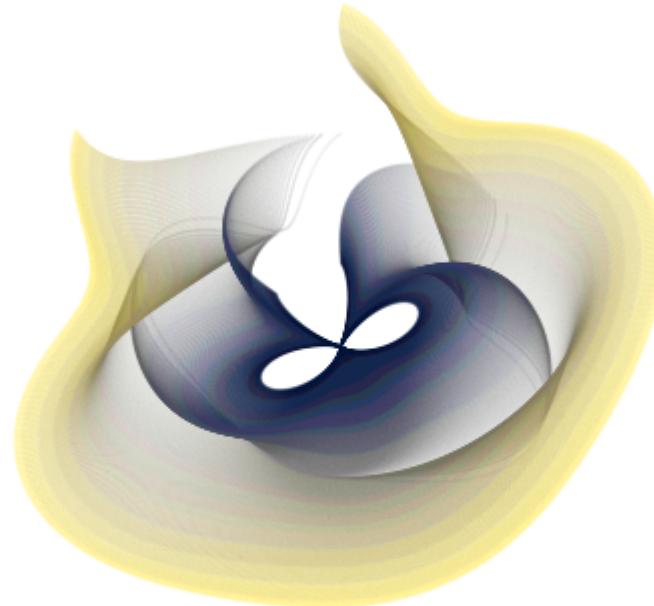
tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .05, size = .05) +
  aes(color = y) +
  scale_color_viridis_c(option = "cividis") +
  # offset of x is determined by sin of y
  aes(x = x - sin(y)) +
  # offset of y is determined by cos of x
  aes(y = y - cos(x)) +
  # and waves are accelerating
  # moving away from zero so use squared value
  aes(x = x - sin(abs(y)^.3)) +
  aes(y = y - cos(x^2)) +
  theme_void() +
  coord_polar() +
  theme(legend.position = "none")

```



```
seq(-3, 3, by = .01) -> my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .05, size = .05) +
  aes(color = y) +
  scale_color_viridis_c(option = "cividis") +
  # offset of x is determined by sin of y
  aes(x = x - sin(y)) +
  # offset of y is determined by cos of x
  aes(y = y - cos(x)) +
  # and waves are accelerating
  # moving away from zero so use squared value
  aes(x = x - sin(abs(y)^.5)) +
  aes(y = y - cos(x^2)) +
  theme_void() +
  coord_polar() +
  theme(legend.position = "none")
```

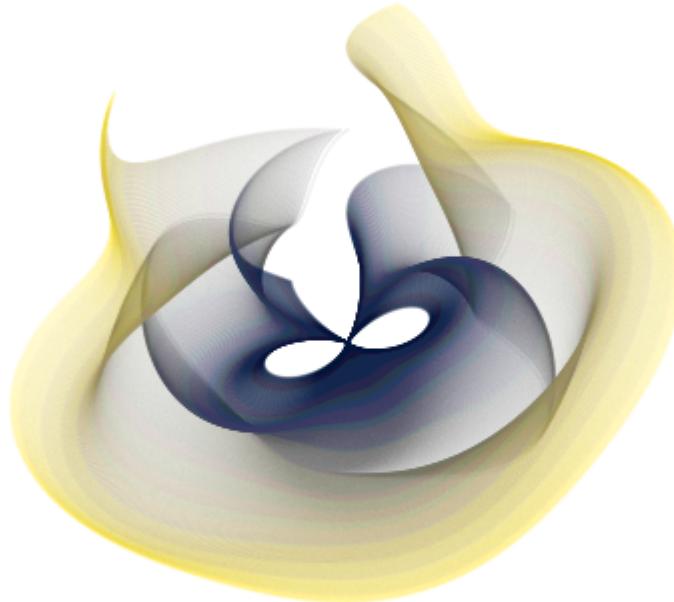


```

seq(-3, 3, by = .01) -> my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .05, size = .05) +
  aes(color = y) +
  scale_color_viridis_c(option = "cividis") +
  # offset of x is determined by sin of y
  aes(x = x - sin(y)) +
  # offset of y is determined by cos of x
  aes(y = y - cos(x)) +
  # and waves are accelerating
  # moving away from zero so use squared value
  aes(x = x - sin(abs(y)^.7)) +
  aes(y = y - cos(x^2)) +
  theme_void() +
  coord_polar() +
  theme(legend.position = "none")

```

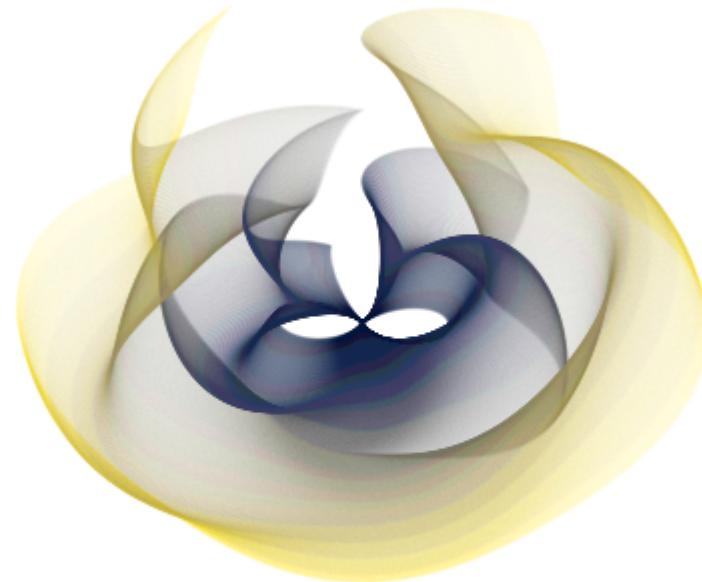


```

seq(-3, 3, by = .01) -> my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .05, size = .05) +
  aes(color = y) +
  scale_color_viridis_c(option = "cividis") +
  # offset of x is determined by sin of y
  aes(x = x - sin(y)) +
  # offset of y is determined by cos of x
  aes(y = y - cos(x)) +
  # and waves are accelerating
  # moving away from zero so use squared value
  aes(x = x - sin(abs(y)^.9)) +
  aes(y = y - cos(x^2)) +
  theme_void() +
  coord_polar() +
  theme(legend.position = "none")

```

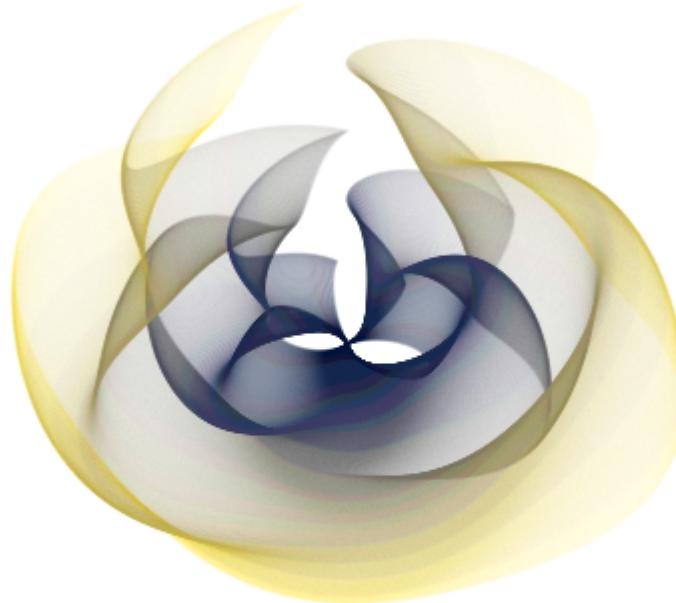


```

seq(-3, 3, by = .01) -> my_seq

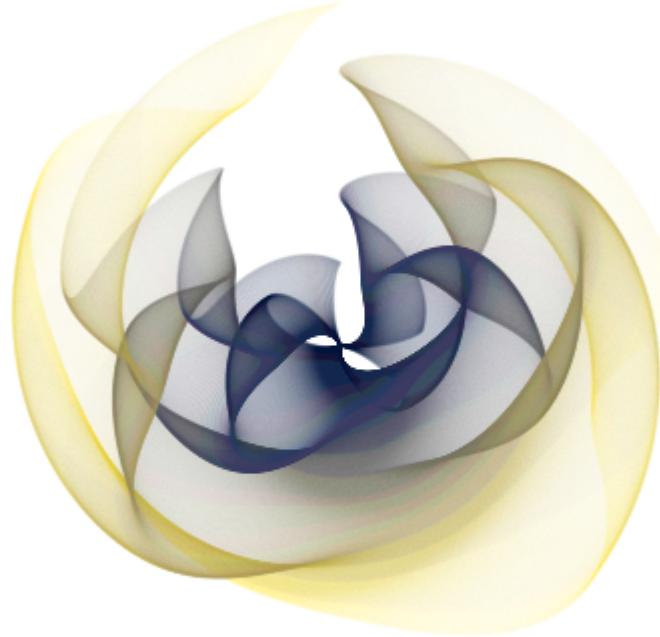
tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .05, size = .05) +
  aes(color = y) +
  scale_color_viridis_c(option = "cividis") +
  # offset of x is determined by sin of y
  aes(x = x - sin(y)) +
  # offset of y is determined by cos of x
  aes(y = y - cos(x)) +
  # and waves are accelerating
  # moving away from zero so use squared value
  aes(x = x - sin(abs(y)^1)) +
  aes(y = y - cos(x^2)) +
  theme_void() +
  coord_polar() +
  theme(legend.position = "none")

```



```
seq(-3, 3, by = .01) -> my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .05, size = .05) +
  aes(color = y) +
  scale_color_viridis_c(option = "cividis") +
  # offset of x is determined by sin of y
  aes(x = x - sin(y)) +
  # offset of y is determined by cos of x
  aes(y = y - cos(x)) +
  # and waves are accelerating
  # moving away from zero so use squared value
  aes(x = x - sin(abs(y)^1.25)) +
  aes(y = y - cos(x^2)) +
  theme_void() +
  coord_polar() +
  theme(legend.position = "none")
```

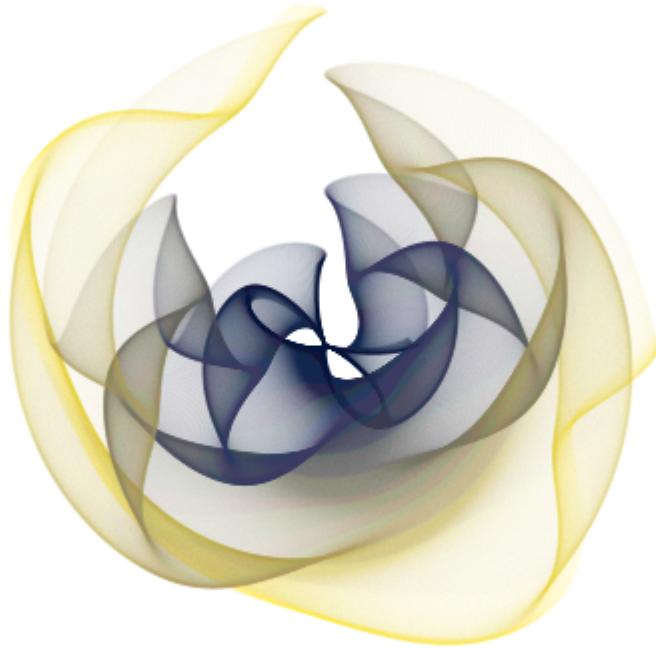


```

seq(-3, 3, by = .01) -> my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .05, size = .05) +
  aes(color = y) +
  scale_color_viridis_c(option = "cividis") +
  # offset of x is determined by sin of y
  aes(x = x - sin(y)) +
  # offset of y is determined by cos of x
  aes(y = y - cos(x)) +
  # and waves are accelerating
  # moving away from zero so use squared value
  aes(x = x - sin(abs(y)^1.5)) +
  aes(y = y - cos(x^2)) +
  theme_void() +
  coord_polar() +
  theme(legend.position = "none")

```

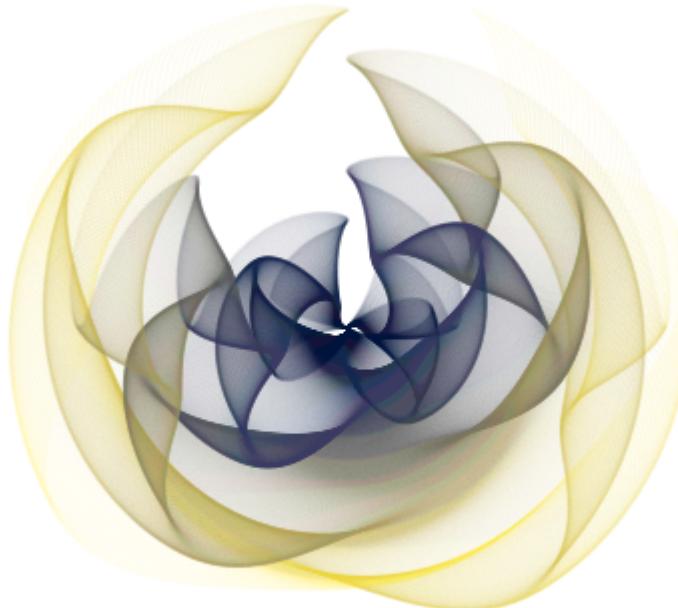


```

seq(-3, 3, by = .01) -> my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .05, size = .05) +
  aes(color = y) +
  scale_color_viridis_c(option = "cividis") +
  # offset of x is determined by sin of y
  aes(x = x - sin(y)) +
  # offset of y is determined by cos of x
  aes(y = y - cos(x)) +
  # and waves are accelerating
  # moving away from zero so use squared value
  aes(x = x - sin(abs(y)^1.75)) +
  aes(y = y - cos(x^2)) +
  theme_void() +
  coord_polar() +
  theme(legend.position = "none")

```

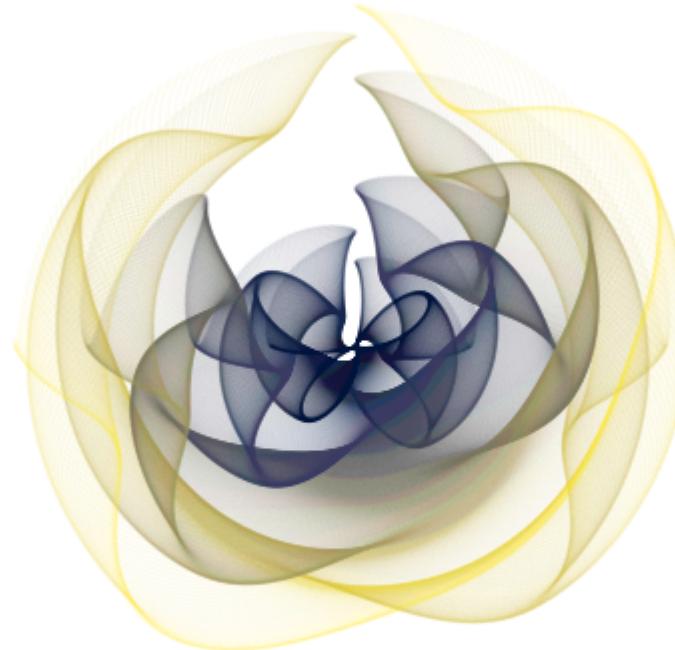


```

seq(-3, 3, by = .01) -> my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x,
      y = y) +
  geom_point(alpha = .05, size = .05) +
  aes(color = y) +
  scale_color_viridis_c(option = "cividis") +
  # offset of x is determined by sin of y
  aes(x = x - sin(y)) +
  # offset of y is determined by cos of x
  aes(y = y - cos(x)) +
  # and waves are accelerating
  # moving away from zero so use squared value
  aes(x = x - sin(abs(y)^1.9)) +
  aes(y = y - cos(x^2)) +
  theme_void() +
  coord_polar() +
  theme(legend.position = "none")

```



stingray


```
seq(0,9, by = 0.1)
```

```
[1] 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8  
[20] 1.9 2.0 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 3.0 3.1 3.2 3.3 3.4 3.5 3.6 3.7  
[39] 3.8 3.9 4.0 4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8 4.9 5.0 5.1 5.2 5.3 5.4 5.5 5.6  
[58] 5.7 5.8 5.9 6.0 6.1 6.2 6.3 6.4 6.5 6.6 6.7 6.8 6.9 7.0 7.1 7.2 7.3 7.4 7.5  
[77] 7.6 7.7 7.8 7.9 8.0 8.1 8.2 8.3 8.4 8.5 8.6 8.7 8.8 8.9 9.0
```

```
seq(0,9, by = 0.1) ->  
my_seq
```

```
seq(0, 9, by = 0.1) ->  
  my_seq  
  
tibble(x = my_seq)
```

A tibble: 91 x 1

x

<dbl>

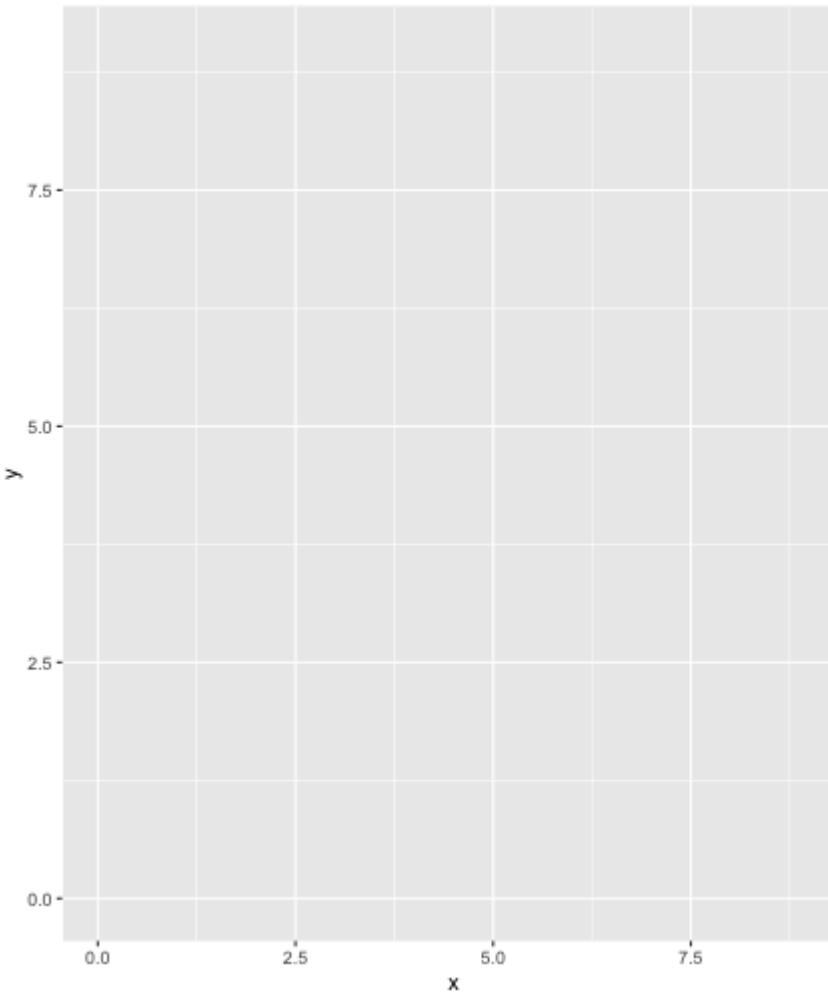
1	0
2	0.1
3	0.2
4	0.3
5	0.4
6	0.5
7	0.6
8	0.7
9	0.8
10	0.9
	# ... with 81 more rows

```
seq(0,9, by = 0.1) ->  
  my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq)
```

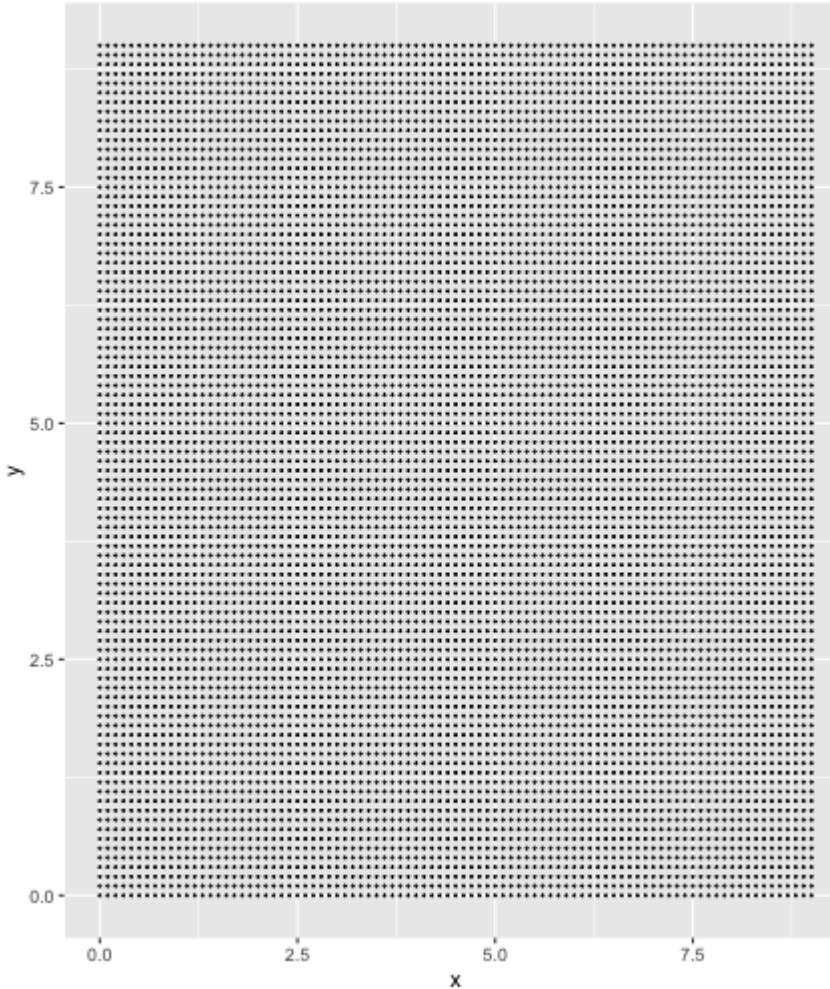
```
# A tibble: 8,281 x 2  
      x     y  
  <dbl> <dbl>  
1     0     0  
2     0     0.1  
3     0     0.2  
4     0     0.3  
5     0     0.4  
6     0     0.5  
7     0     0.6  
8     0     0.7  
9     0     0.8  
10    0     0.9  
# ... with 8,271 more rows
```

```
seq(0,9, by = 0.1) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot()
```

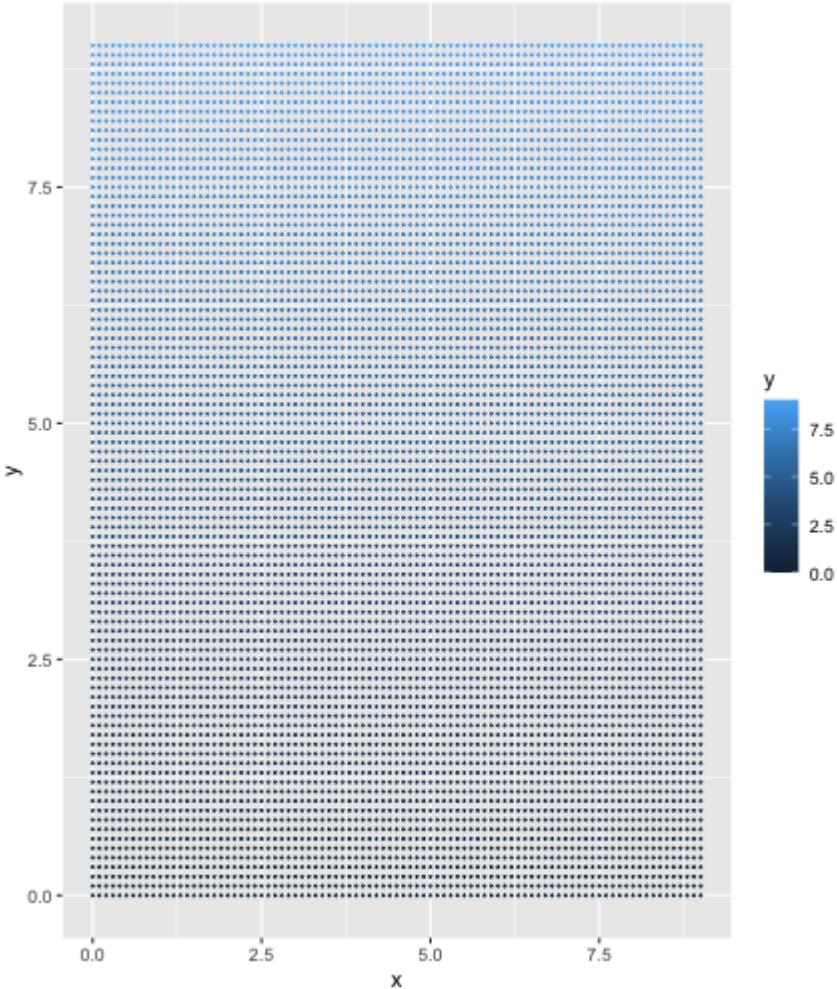
```
seq(0,9, by = 0.1) ->  
my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot() +  
  aes(x = x, y = y)
```



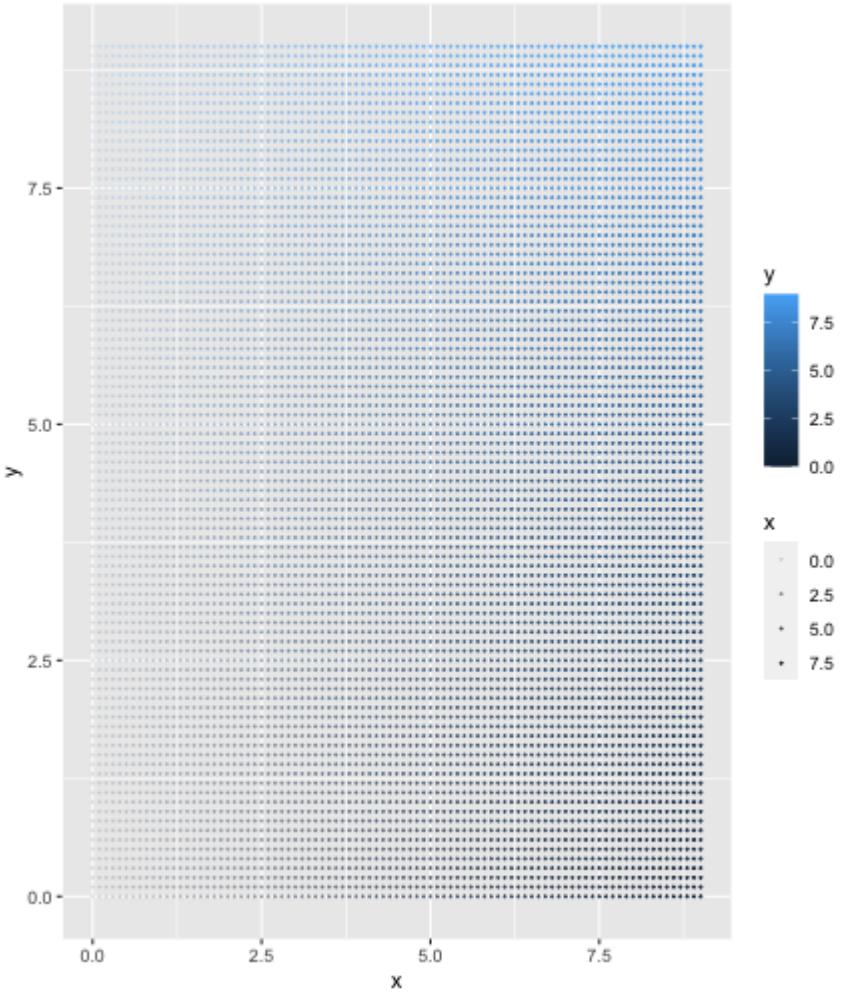
```
seq(0,9, by = 0.1) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x, y = y) +  
geom_point(size = .1)
```



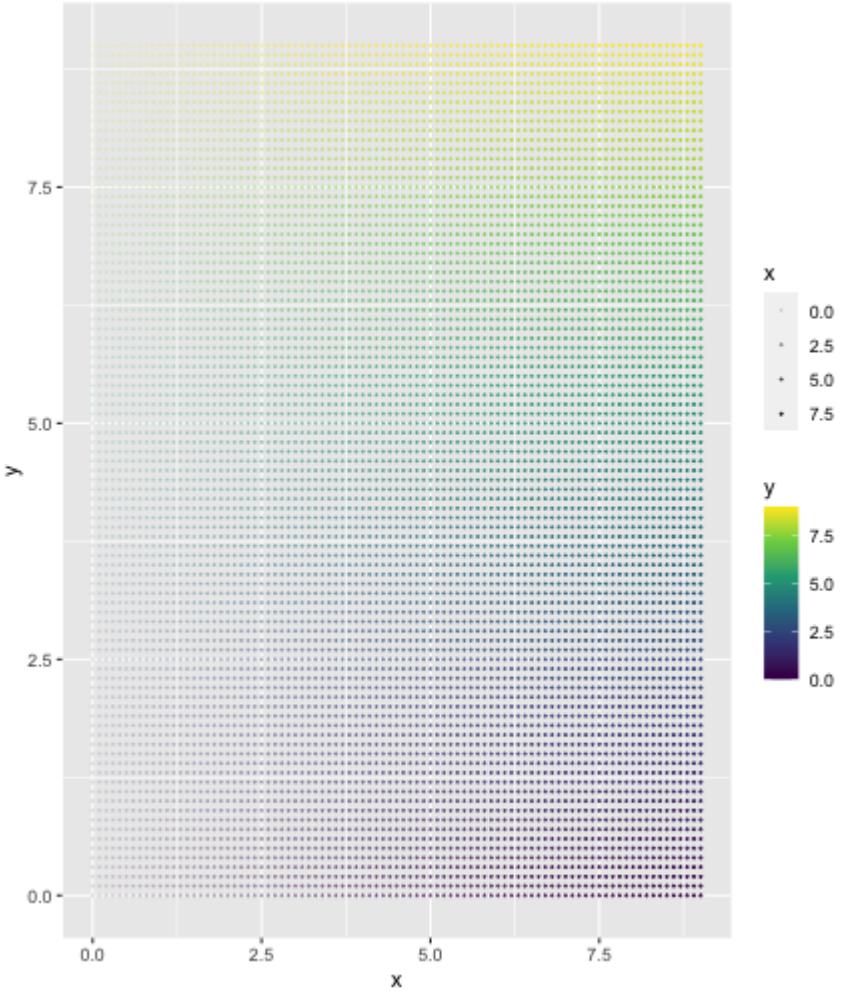
```
seq(0,9, by = 0.1) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x, y = y) +  
geom_point(size = .1) +  
aes(color = y)
```



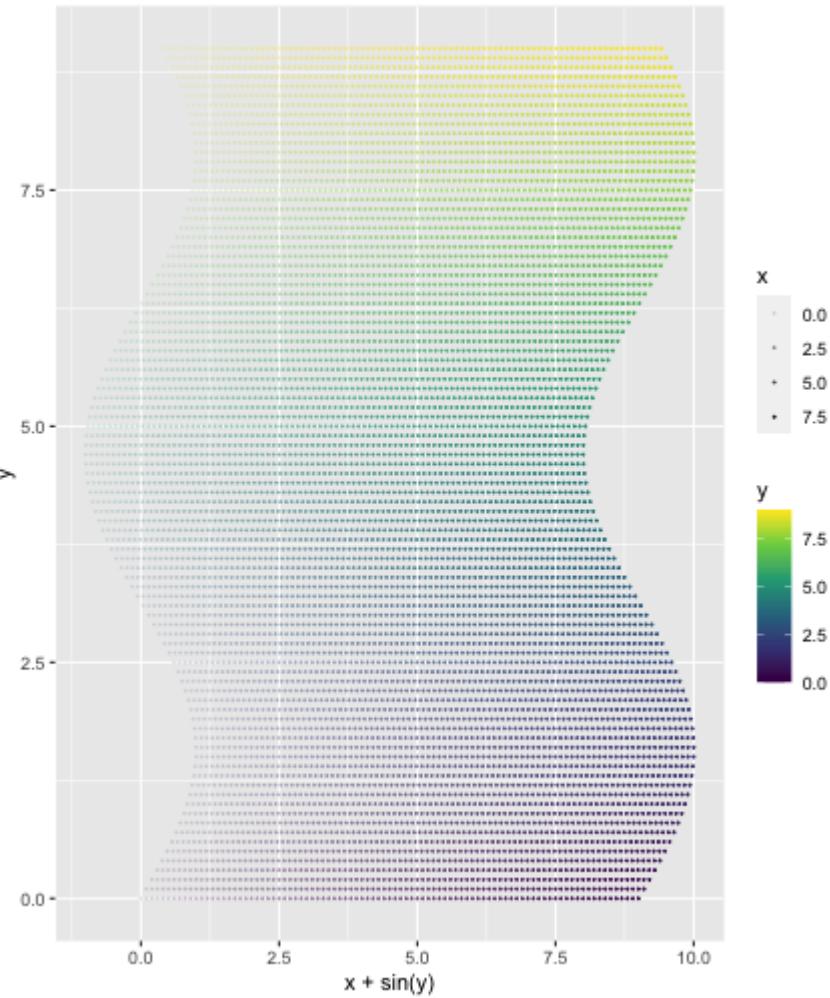
```
seq(0,9, by = 0.1) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x, y = y) +  
geom_point(size = .1) +  
aes(color = y) +  
aes(alpha = x)
```



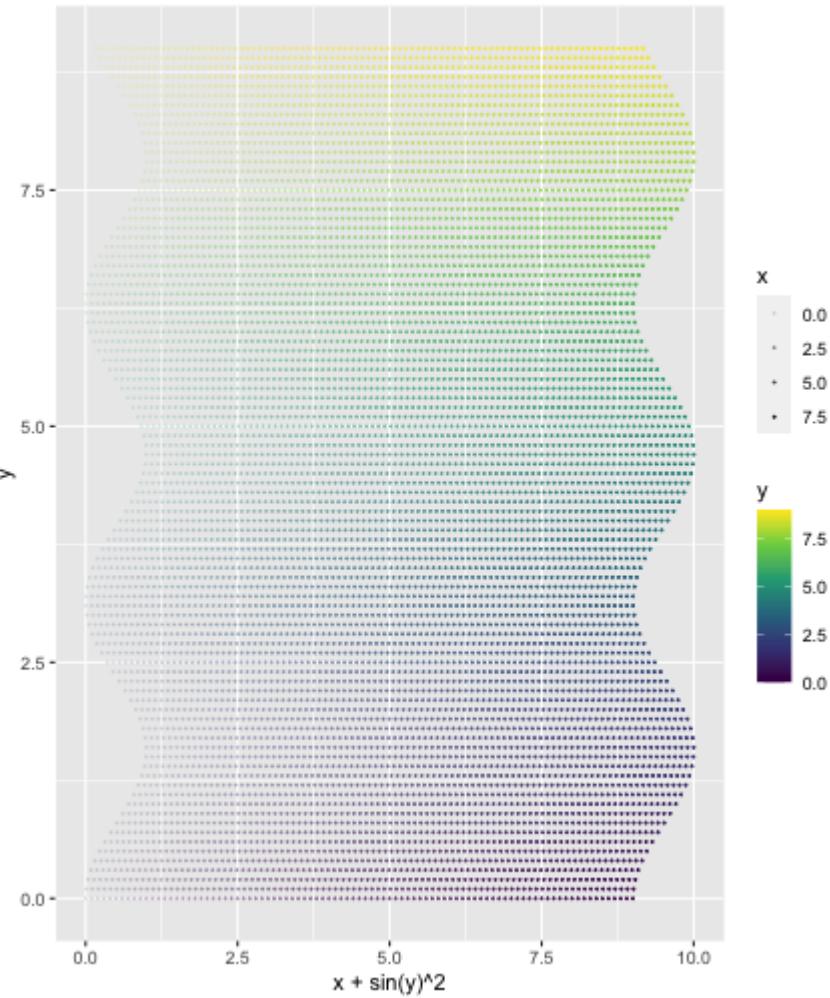
```
seq(0,9, by = 0.1) ->  
  my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot() +  
  aes(x = x, y = y) +  
  geom_point(size = .1) +  
  aes(color = y) +  
  aes(alpha = x) +  
  scale_color_viridis_c()
```



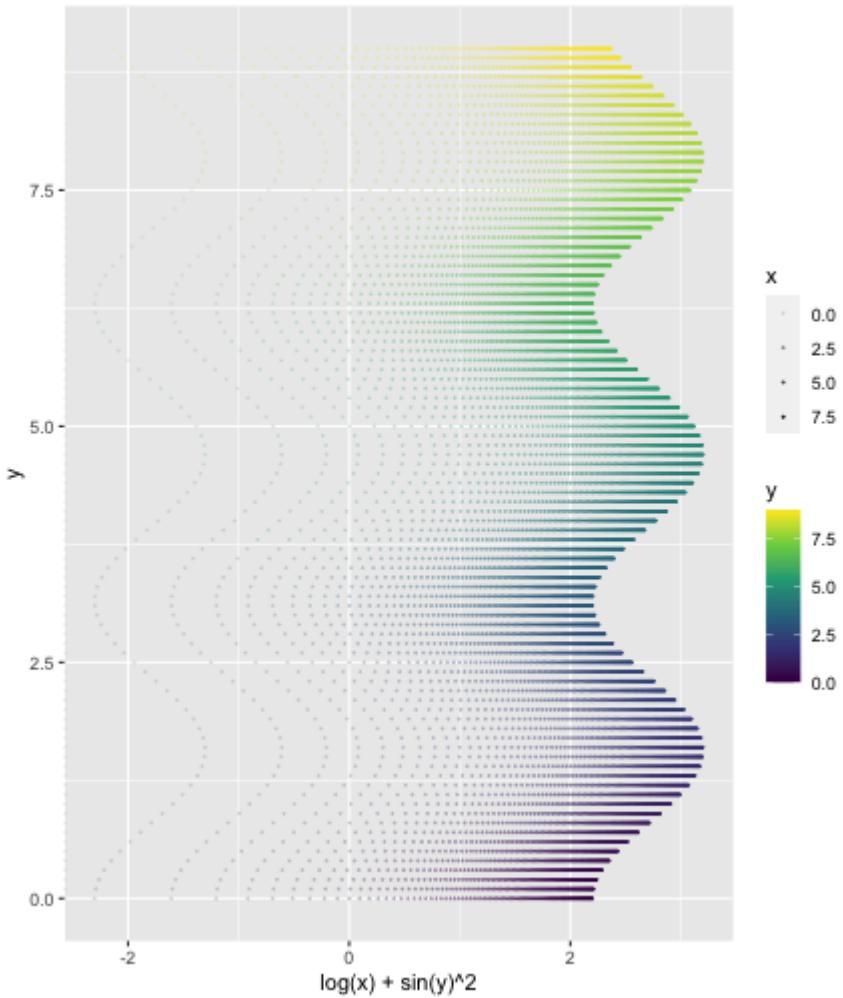
```
seq(0,9, by = 0.1) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x, y = y) +  
geom_point(size = .1) +  
aes(color = y) +  
aes(alpha = x) +  
scale_color_viridis_c() +  
aes(x = x + sin(y))
```



```
seq(0,9, by = 0.1) ->  
my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot() +  
  aes(x = x, y = y) +  
  geom_point(size = .1) +  
  aes(color = y) +  
  aes(alpha = x) +  
  scale_color_viridis_c() +  
  aes(x = x + sin(y)) +  
  aes(x = x + sin(y)^2)
```



```
seq(0,9, by = 0.1) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x, y = y) +  
geom_point(size = .1) +  
aes(color = y) +  
aes(alpha = x) +  
scale_color_viridis_c() +  
aes(x = x + sin(y)) +  
aes(x = x + sin(y)^2) +  
aes(x = log(x) + sin(y)^2)
```

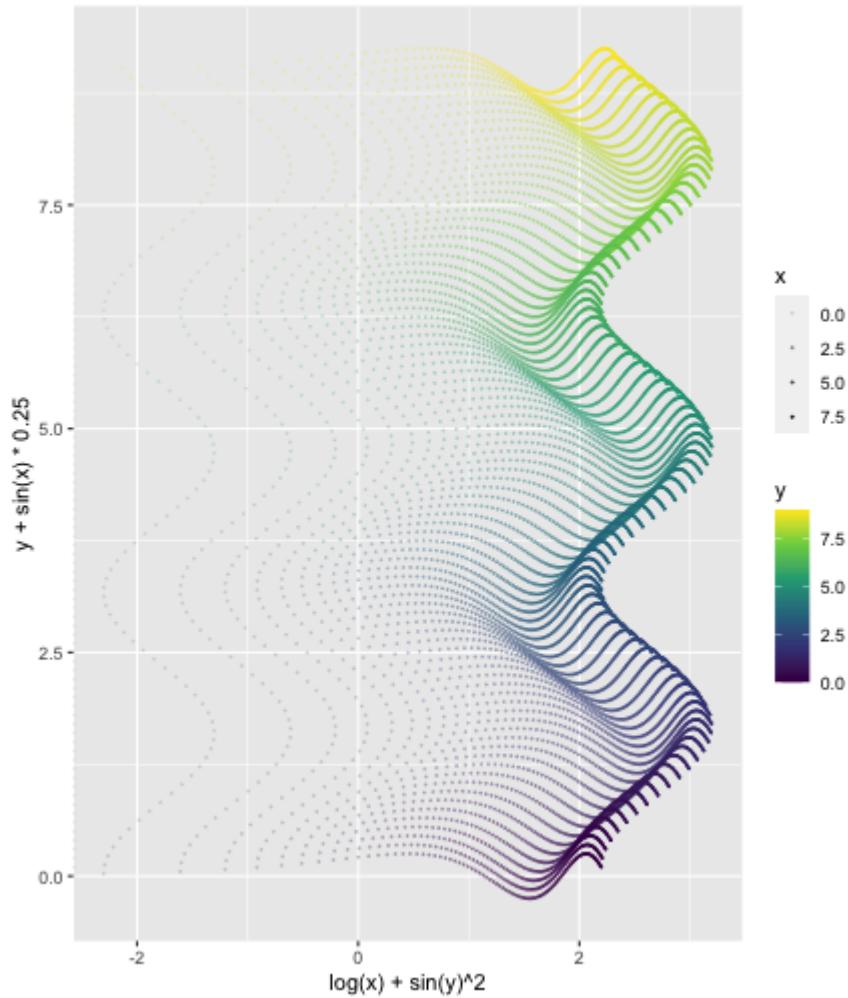


```

seq(0,9, by = 0.1) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x, y = y) +
  geom_point(size = .1) +
  aes(color = y) +
  aes(alpha = x) +
  scale_color_viridis_c() +
  aes(x = x + sin(y)) +
  aes(x = x + sin(y)^2) +
  aes(x = log(x) + sin(y)^2) +
  aes(y = y + sin(x)*.25)

```

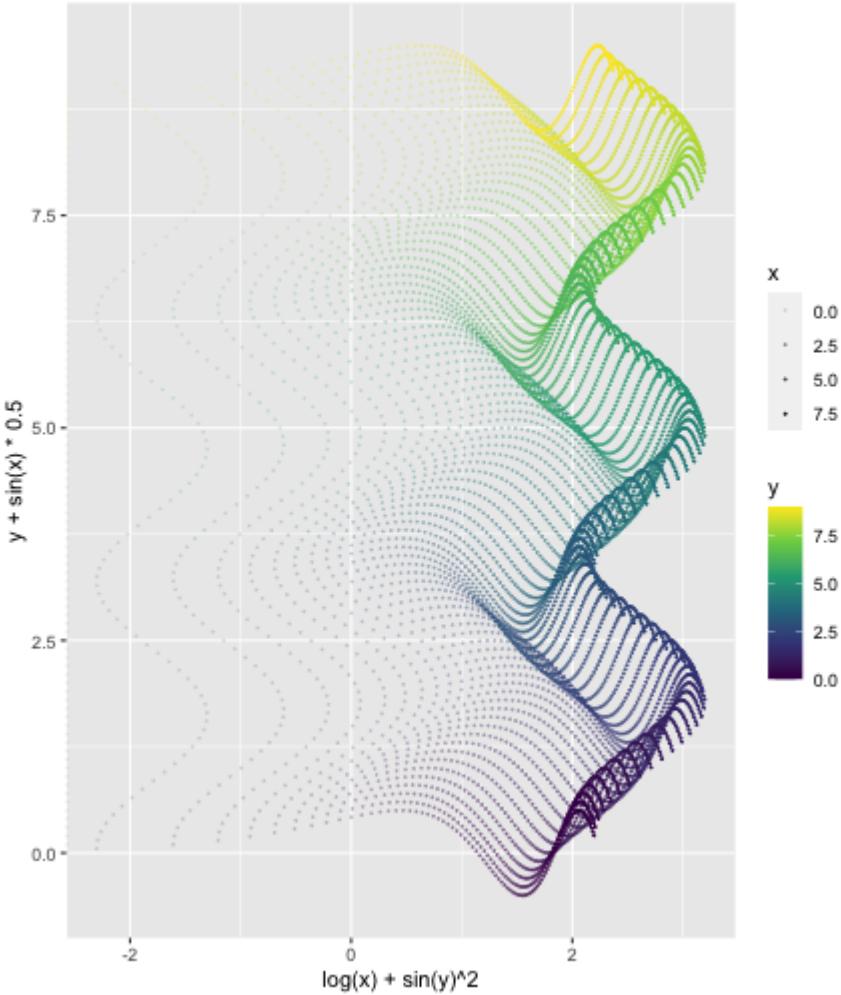


```

seq(0,9, by = 0.1) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x, y = y) +
  geom_point(size = .1) +
  aes(color = y) +
  aes(alpha = x) +
  scale_color_viridis_c() +
  aes(x = x + sin(y)) +
  aes(x = x + sin(y)^2) +
  aes(x = log(x) + sin(y)^2) +
  aes(y = y + sin(x)*.25) +
  aes(y = y + sin(x)*.5)

```

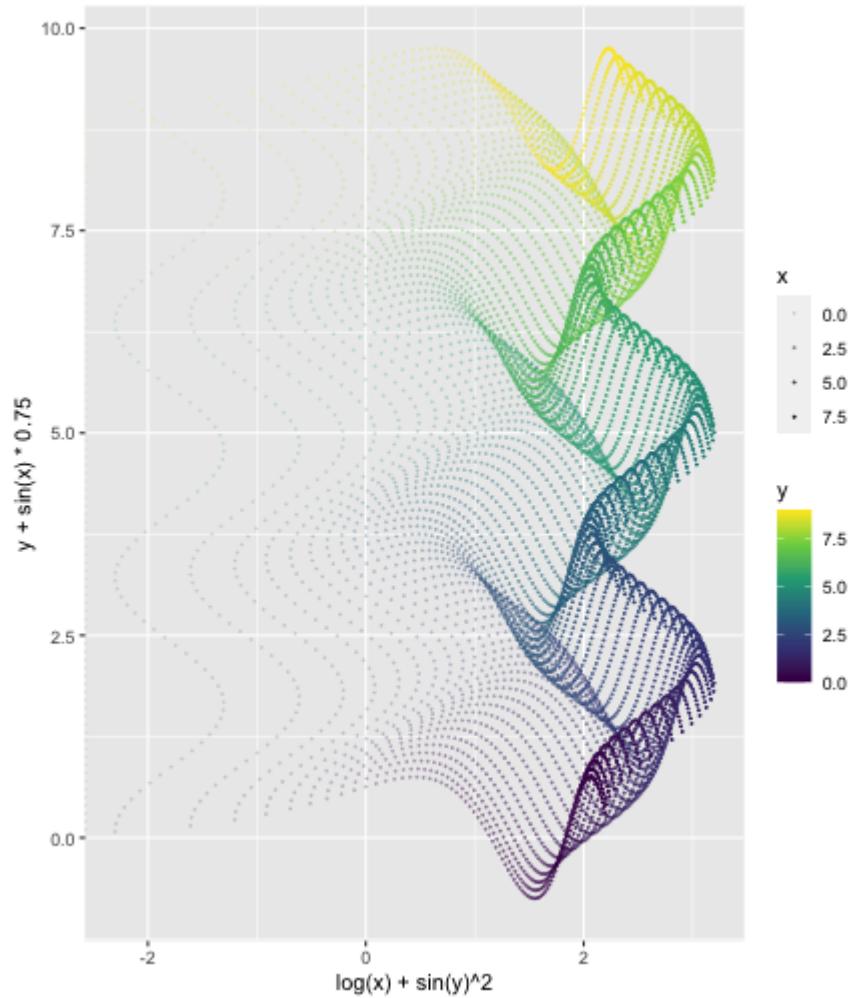


```

seq(0,9, by = 0.1) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x, y = y) +
  geom_point(size = .1) +
  aes(color = y) +
  aes(alpha = x) +
  scale_color_viridis_c() +
  aes(x = x + sin(y)) +
  aes(x = x + sin(y)^2) +
  aes(x = log(x) + sin(y)^2) +
  aes(y = y + sin(x)*.25) +
  aes(y = y + sin(x)*.5) +
  aes(y = y + sin(x)*.75)

```

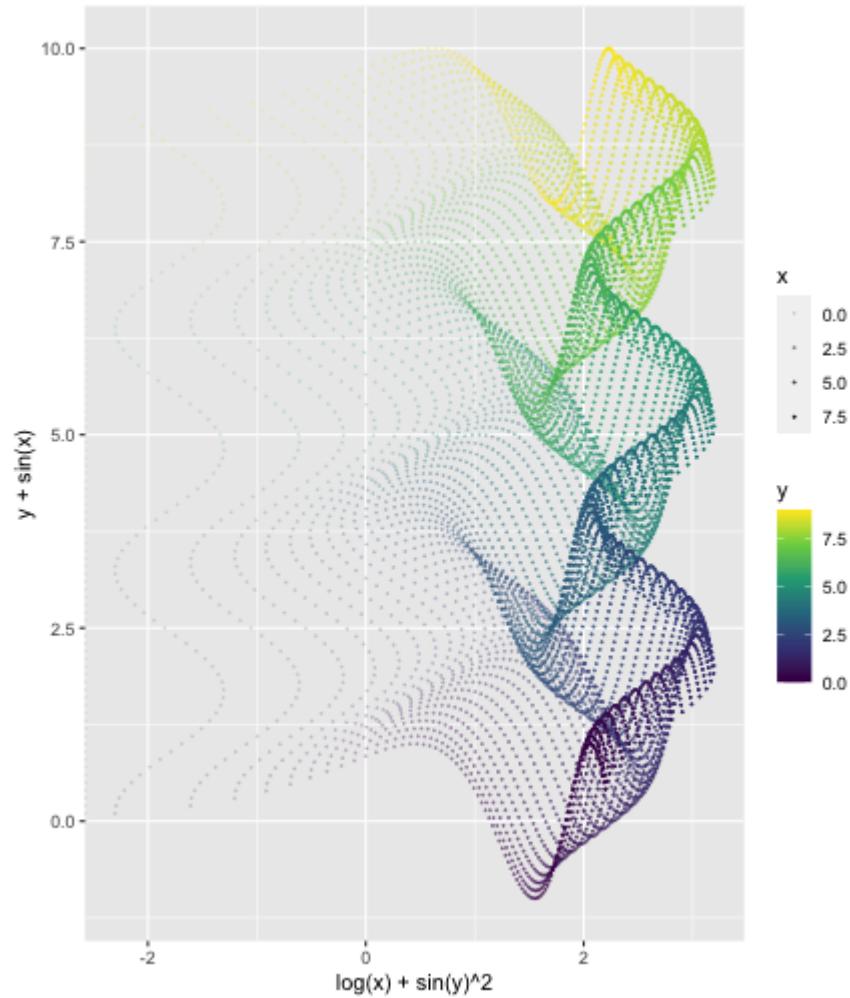


```

seq(0,9, by = 0.1) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x, y = y) +
  geom_point(size = .1) +
  aes(color = y) +
  aes(alpha = x) +
  scale_color_viridis_c() +
  aes(x = x + sin(y)) +
  aes(x = x + sin(y)^2) +
  aes(x = log(x) + sin(y)^2) +
  aes(y = y + sin(x)*.25) +
  aes(y = y + sin(x)*.5) +
  aes(y = y + sin(x)*.75) +
  aes(y = y + sin(x))

```

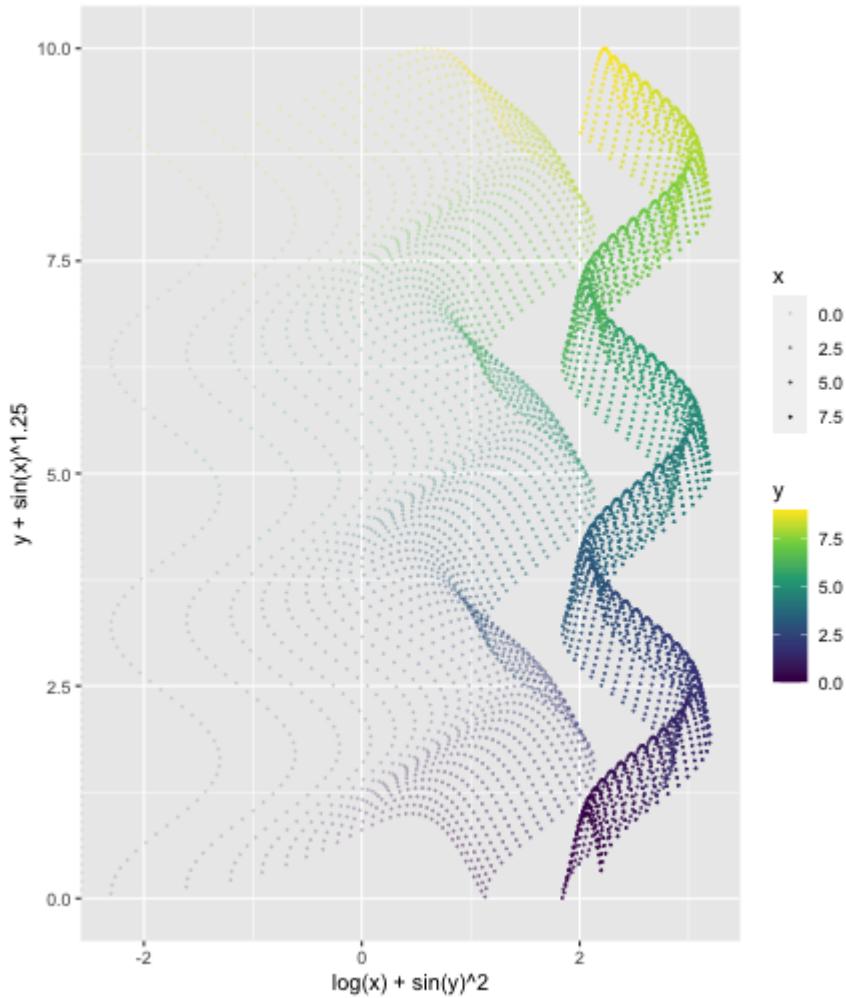


```

seq(0,9, by = 0.1) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x, y = y) +
  geom_point(size = .1) +
  aes(color = y) +
  aes(alpha = x) +
  scale_color_viridis_c() +
  aes(x = x + sin(y)) +
  aes(x = x + sin(y)^2) +
  aes(x = log(x) + sin(y)^2) +
  aes(y = y + sin(x)*.25) +
  aes(y = y + sin(x)*.5) +
  aes(y = y + sin(x)*.75) +
  aes(y = y + sin(x)) +
  aes(y = y + sin(x)^1.25)

```

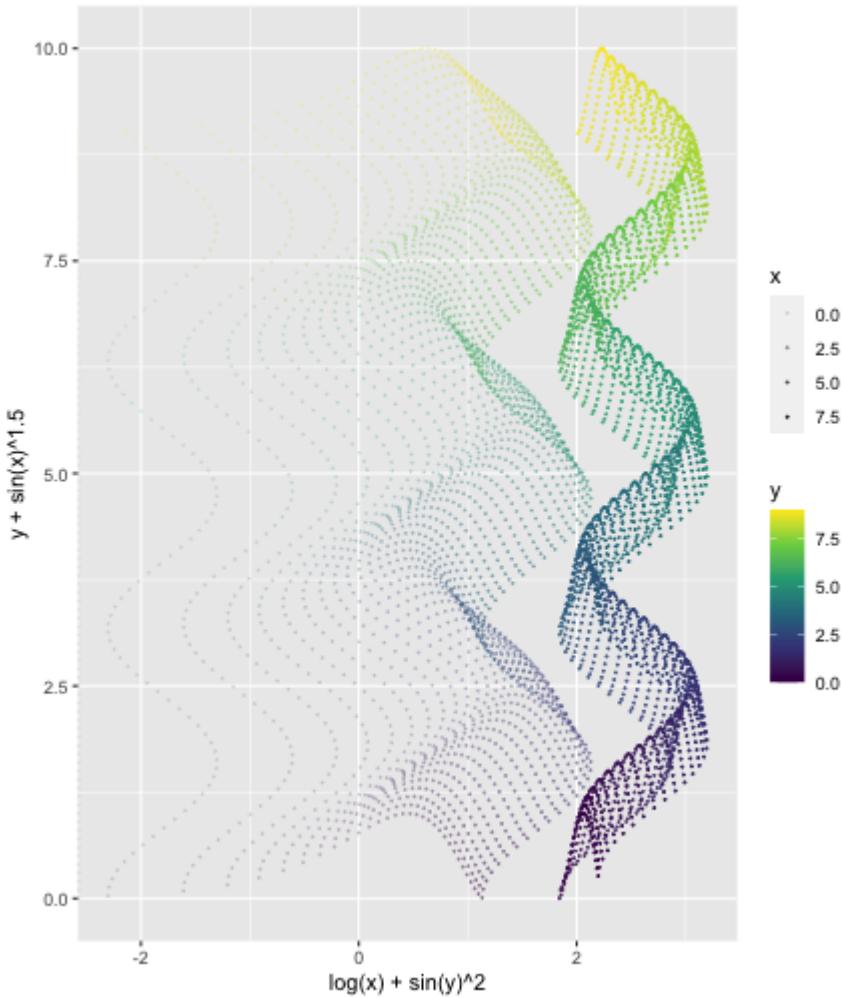


```

seq(0,9, by = 0.1) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x, y = y) +
  geom_point(size = .1) +
  aes(color = y) +
  aes(alpha = x) +
  scale_color_viridis_c() +
  aes(x = x + sin(y)) +
  aes(x = x + sin(y)^2) +
  aes(x = log(x) + sin(y)^2) +
  aes(y = y + sin(x)*.25) +
  aes(y = y + sin(x)*.5) +
  aes(y = y + sin(x)*.75) +
  aes(y = y + sin(x)) +
  aes(y = y + sin(x)^1.25) +
  aes(y = y + sin(x)^1.5)

```

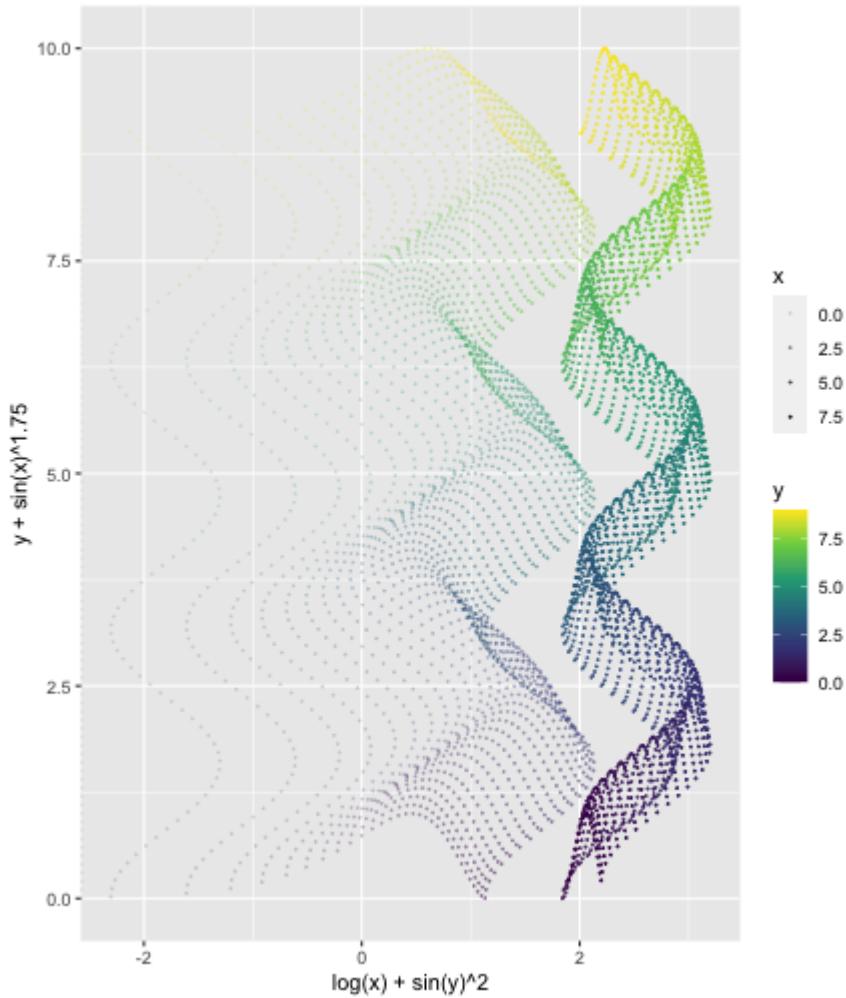


```

seq(0,9, by = 0.1) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x, y = y) +
  geom_point(size = .1) +
  aes(color = y) +
  aes(alpha = x) +
  scale_color_viridis_c() +
  aes(x = x + sin(y)) +
  aes(x = x + sin(y)^2) +
  aes(x = log(x) + sin(y)^2) +
  aes(y = y + sin(x)*.25) +
  aes(y = y + sin(x)*.5) +
  aes(y = y + sin(x)*.75) +
  aes(y = y + sin(x)) +
  aes(y = y + sin(x)^1.25) +
  aes(y = y + sin(x)^1.5) +
  aes(y = y + sin(x)^1.75)

```

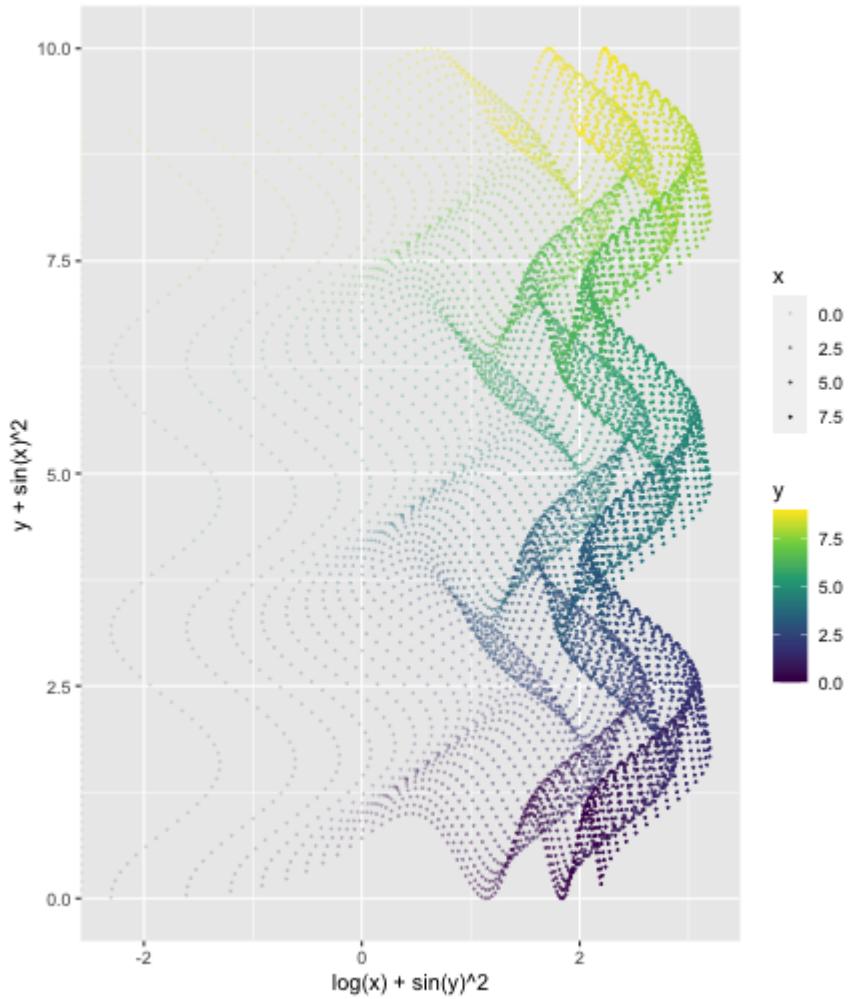


```

seq(0,9, by = 0.1) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x, y = y) +
  geom_point(size = .1) +
  aes(color = y) +
  aes(alpha = x) +
  scale_color_viridis_c() +
  aes(x = x + sin(y)) +
  aes(x = x + sin(y)^2) +
  aes(x = log(x) + sin(y)^2) +
  aes(y = y + sin(x)*.25) +
  aes(y = y + sin(x)*.5) +
  aes(y = y + sin(x)*.75) +
  aes(y = y + sin(x)) +
  aes(y = y + sin(x)^1.25) +
  aes(y = y + sin(x)^1.5) +
  aes(y = y + sin(x)^1.75) +
  aes(y = y + sin(x)^2)

```

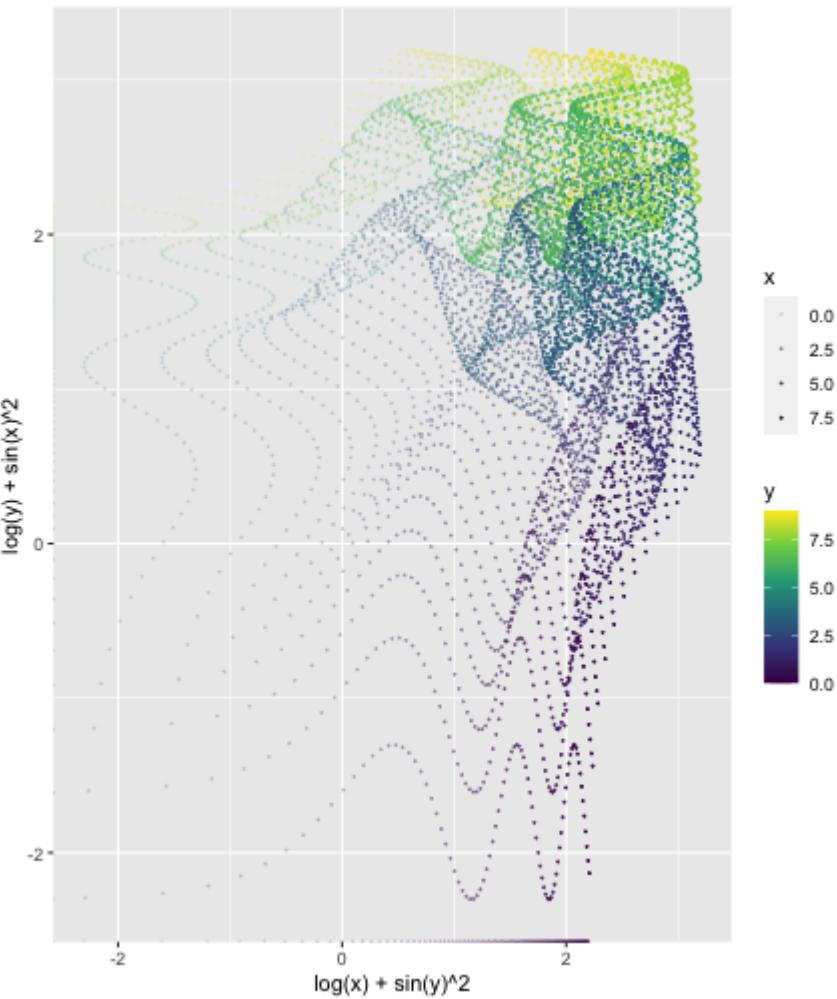


```

seq(0, 9, by = 0.1) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x, y = y) +
  geom_point(size = .1) +
  aes(color = y) +
  aes(alpha = x) +
  scale_color_viridis_c() +
  aes(x = x + sin(y)) +
  aes(x = x + sin(y)^2) +
  aes(x = log(x) + sin(y)^2) +
  aes(y = y + sin(x)*.25) +
  aes(y = y + sin(x)*.5) +
  aes(y = y + sin(x)*.75) +
  aes(y = y + sin(x)) +
  aes(y = y + sin(x)^1.25) +
  aes(y = y + sin(x)^1.5) +
  aes(y = y + sin(x)^1.75) +
  aes(y = y + sin(x)^2) +
  aes(y = log(y) + sin(x)^2)

```

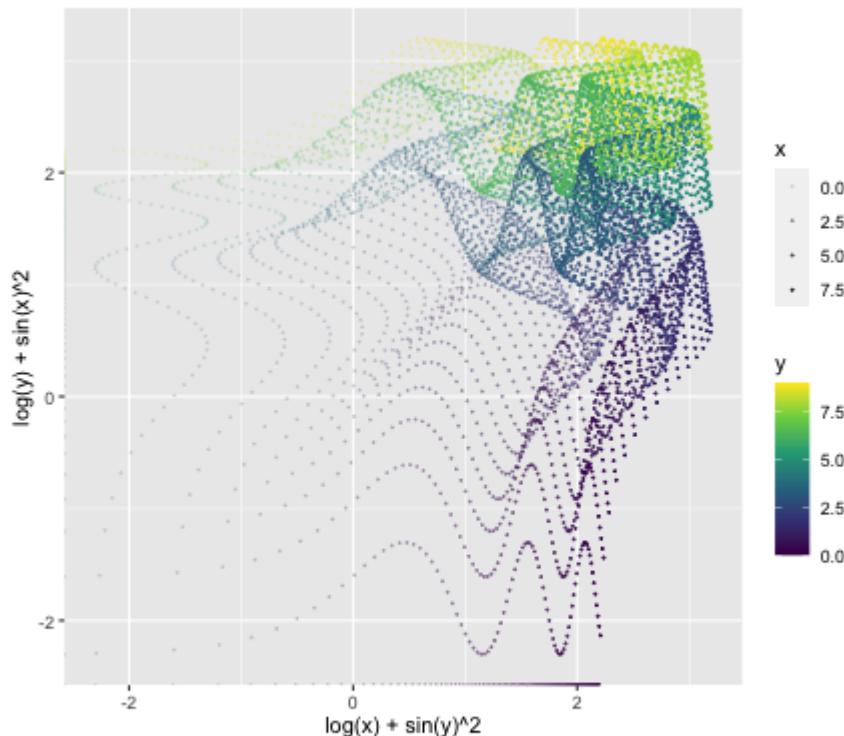


```

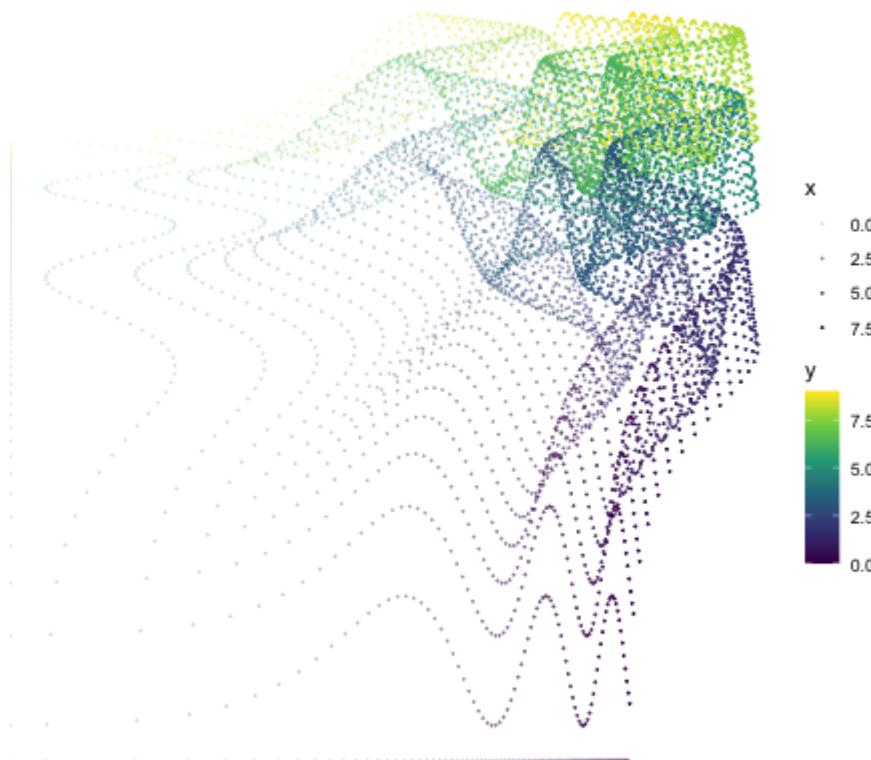
seq(0, 9, by = 0.1) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x, y = y) +
  geom_point(size = .1) +
  aes(color = y) +
  aes(alpha = x) +
  scale_color_viridis_c() +
  aes(x = x + sin(y)) +
  aes(x = x + sin(y)^2) +
  aes(x = log(x) + sin(y)^2) +
  aes(y = y + sin(x)*.25) +
  aes(y = y + sin(x)*.5) +
  aes(y = y + sin(x)*.75) +
  aes(y = y + sin(x)) +
  aes(y = y + sin(x)^1.25) +
  aes(y = y + sin(x)^1.5) +
  aes(y = y + sin(x)^1.75) +
  aes(y = y + sin(x)^2) +
  aes(y = log(y) + sin(x)^2) +
  coord_equal()

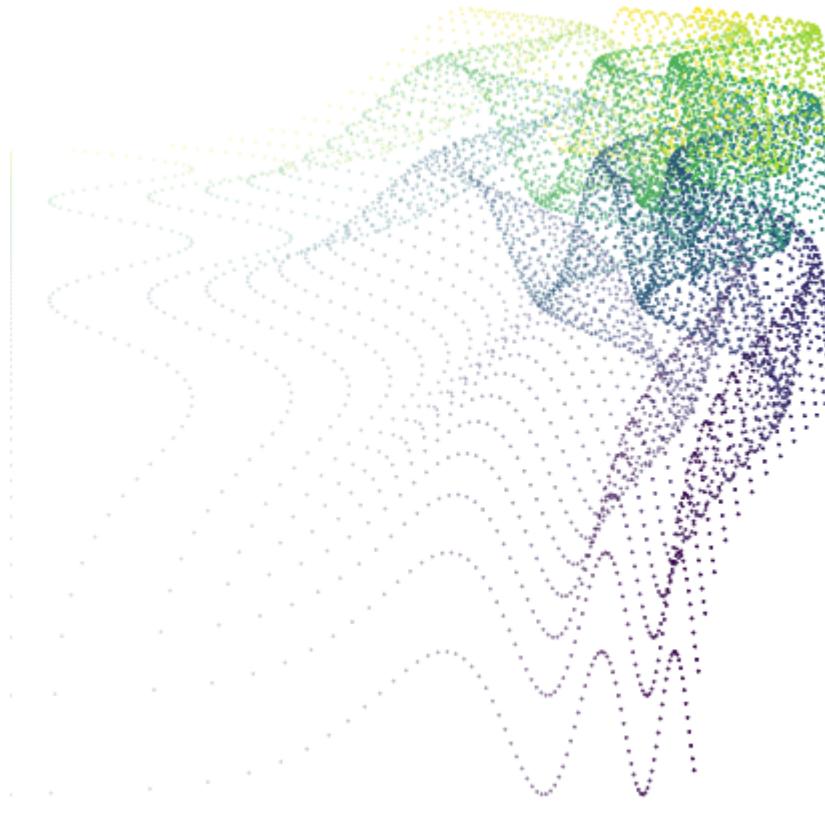
```



```
seq(0,9, by = 0.1) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x, y = y) +  
geom_point(size = .1) +  
aes(color = y) +  
aes(alpha = x) +  
scale_color_viridis_c() +  
aes(x = x + sin(y)) +  
aes(x = x + sin(y)^2) +  
aes(x = log(x) + sin(y)^2) +  
aes(y = y + sin(x)*.25) +  
aes(y = y + sin(x)*.5) +  
aes(y = y + sin(x)*.75) +  
aes(y = y + sin(x)) +  
aes(y = y + sin(x)^1.25) +  
aes(y = y + sin(x)^1.5) +  
aes(y = y + sin(x)^1.75) +  
aes(y = y + sin(x)^2) +  
aes(y = log(y) + sin(x)^2) +  
coord_equal() +  
theme_void()
```



```
seq(0,9, by = 0.1) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x, y = y) +  
geom_point(size = .1) +  
aes(color = y) +  
aes(alpha = x) +  
scale_color_viridis_c() +  
aes(x = x + sin(y)) +  
aes(x = x + sin(y)^2) +  
aes(x = log(x) + sin(y)^2) +  
aes(y = y + sin(x)*.25) +  
aes(y = y + sin(x)*.5) +  
aes(y = y + sin(x)*.75) +  
aes(y = y + sin(x)) +  
aes(y = y + sin(x)^1.25) +  
aes(y = y + sin(x)^1.5) +  
aes(y = y + sin(x)^1.75) +  
aes(y = y + sin(x)^2) +  
aes(y = log(y) + sin(x)^2) +  
coord_equal() +  
theme_void() +  
theme(legend.position = "none")
```



stingray higher res

```
seq(0,9, by = 0.025)
```

```
[1] 0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200 0.225 0.250 0.275  
[13] 0.300 0.325 0.350 0.375 0.400 0.425 0.450 0.475 0.500 0.525 0.550 0.575  
[25] 0.600 0.625 0.650 0.675 0.700 0.725 0.750 0.775 0.800 0.825 0.850 0.875  
[37] 0.900 0.925 0.950 0.975 1.000 1.025 1.050 1.075 1.100 1.125 1.150 1.175  
[49] 1.200 1.225 1.250 1.275 1.300 1.325 1.350 1.375 1.400 1.425 1.450 1.475  
[61] 1.500 1.525 1.550 1.575 1.600 1.625 1.650 1.675 1.700 1.725 1.750 1.775  
[73] 1.800 1.825 1.850 1.875 1.900 1.925 1.950 1.975 2.000 2.025 2.050 2.075  
[85] 2.100 2.125 2.150 2.175 2.200 2.225 2.250 2.275 2.300 2.325 2.350 2.375  
[97] 2.400 2.425 2.450 2.475 2.500 2.525 2.550 2.575 2.600 2.625 2.650 2.675  
[109] 2.700 2.725 2.750 2.775 2.800 2.825 2.850 2.875 2.900 2.925 2.950 2.975  
[121] 3.000 3.025 3.050 3.075 3.100 3.125 3.150 3.175 3.200 3.225 3.250 3.275  
[133] 3.300 3.325 3.350 3.375 3.400 3.425 3.450 3.475 3.500 3.525 3.550 3.575  
[145] 3.600 3.625 3.650 3.675 3.700 3.725 3.750 3.775 3.800 3.825 3.850 3.875  
[157] 3.900 3.925 3.950 3.975 4.000 4.025 4.050 4.075 4.100 4.125 4.150 4.175  
[169] 4.200 4.225 4.250 4.275 4.300 4.325 4.350 4.375 4.400 4.425 4.450 4.475  
[181] 4.500 4.525 4.550 4.575 4.600 4.625 4.650 4.675 4.700 4.725 4.750 4.775  
[193] 4.800 4.825 4.850 4.875 4.900 4.925 4.950 4.975 5.000 5.025 5.050 5.075  
[205] 5.100 5.125 5.150 5.175 5.200 5.225 5.250 5.275 5.300 5.325 5.350 5.375  
[217] 5.400 5.425 5.450 5.475 5.500 5.525 5.550 5.575 5.600 5.625 5.650 5.675  
[229] 5.700 5.725 5.750 5.775 5.800 5.825 5.850 5.875 5.900 5.925 5.950 5.975  
[241] 6.000 6.025 6.050 6.075 6.100 6.125 6.150 6.175 6.200 6.225 6.250 6.275  
[253] 6.300 6.325 6.350 6.375 6.400 6.425 6.450 6.475 6.500 6.525 6.550 6.575  
[265] 6.600 6.625 6.650 6.675 6.700 6.725 6.750 6.775 6.800 6.825 6.850 6.875  
[277] 6.900 6.925 6.950 6.975 7.000 7.025 7.050 7.075 7.100 7.125 7.150 7.175  
[289] 7.200 7.225 7.250 7.275 7.300 7.325 7.350 7.375 7.400 7.425 7.450 7.475  
[301] 7.500 7.525 7.550 7.575 7.600 7.625 7.650 7.675 7.700 7.725 7.750 7.775  
[313] 7.800 7.825 7.850 7.875 7.900 7.925 7.950 7.975 8.000 8.025 8.050 8.075  
[325] 8.100 8.125 8.150 8.175 8.200 8.225 8.250 8.275 8.300 8.325 8.350 8.375  
[337] 8.400 8.425 8.450 8.475 8.500 8.525 8.550 8.575 8.600 8.625 8.650 8.675  
[349] 8.700 8.725 8.750 8.775 8.800 8.825 8.850 8.875 8.900 8.925 8.950 8.975  
[361] 9.000
```

```
seq(0,9, by = 0.025) ->  
my_seq
```

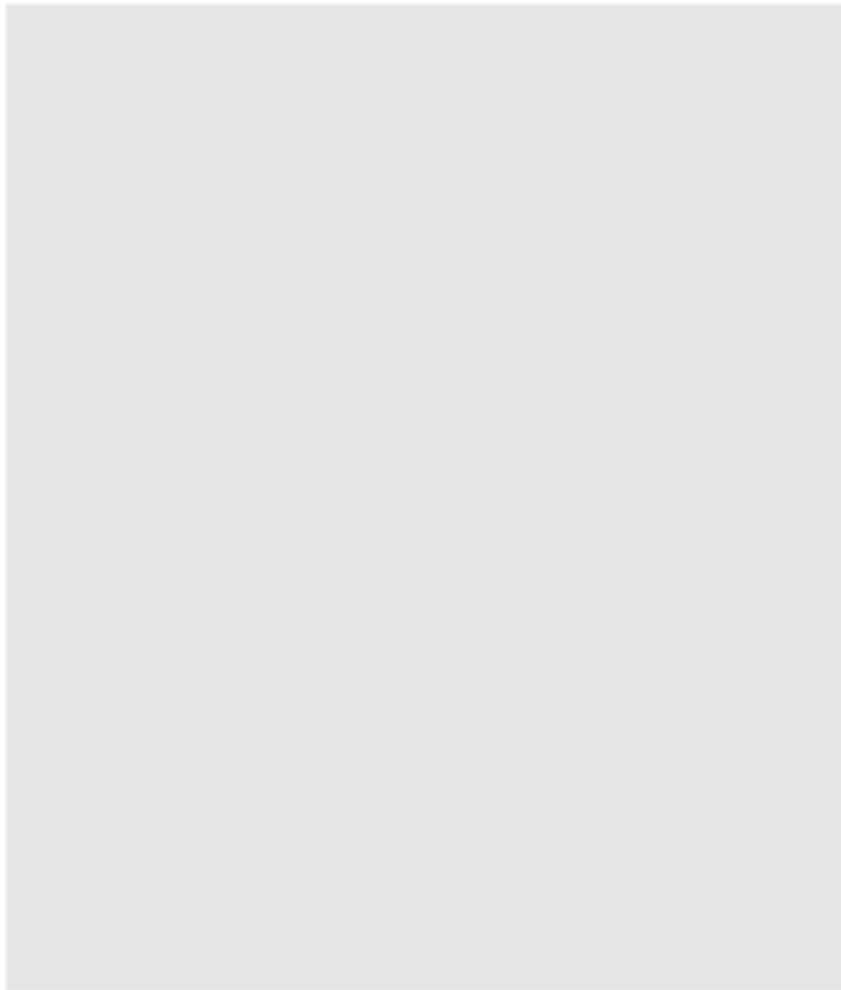
```
seq(0, 9, by = 0.025) ->  
  my_seq  
  
tibble(x = my_seq)
```

```
# A tibble: 361 x 1  
      x  
     <dbl>  
1 0  
2 0.025  
3 0.05  
4 0.075  
5 0.1  
6 0.125  
7 0.15  
8 0.175  
9 0.2  
10 0.225  
# ... with 351 more rows
```

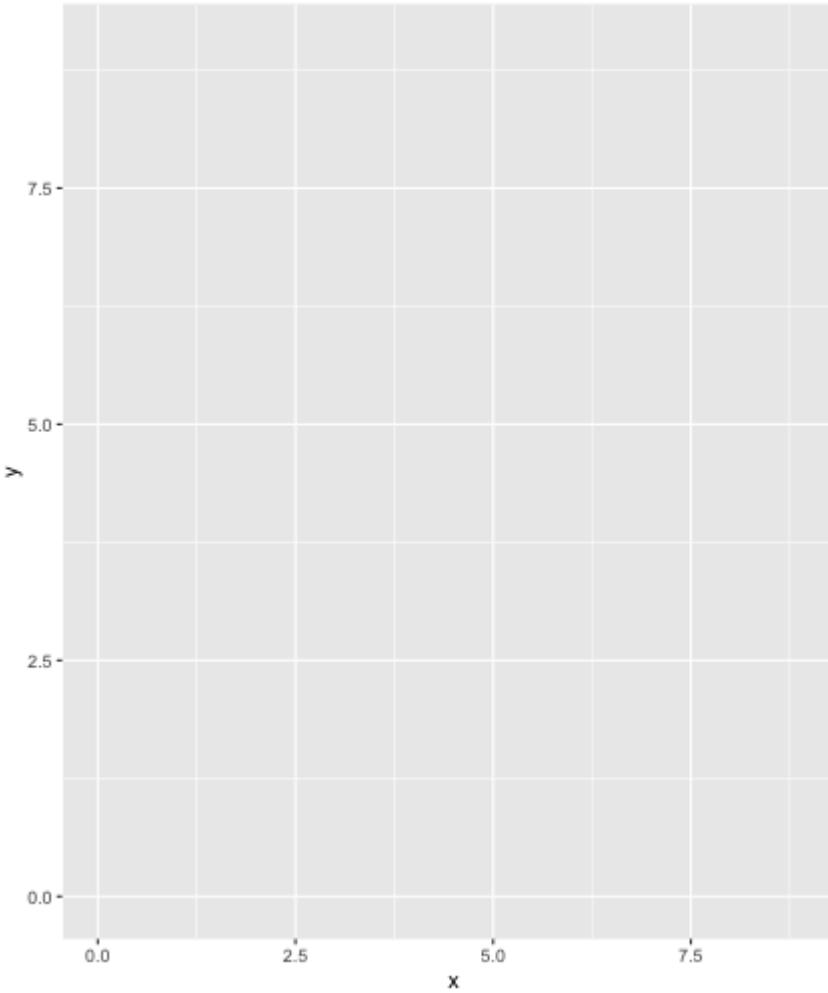
```
seq(0,9, by = 0.025) ->  
  my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq)
```

```
# A tibble: 130,321 x 2  
      x     y  
  <dbl> <dbl>  
1     0  0  
2     0  0.025  
3     0  0.05  
4     0  0.075  
5     0  0.1  
6     0  0.125  
7     0  0.15  
8     0  0.175  
9     0  0.2  
10    0  0.225  
# ... with 130,311 more rows
```

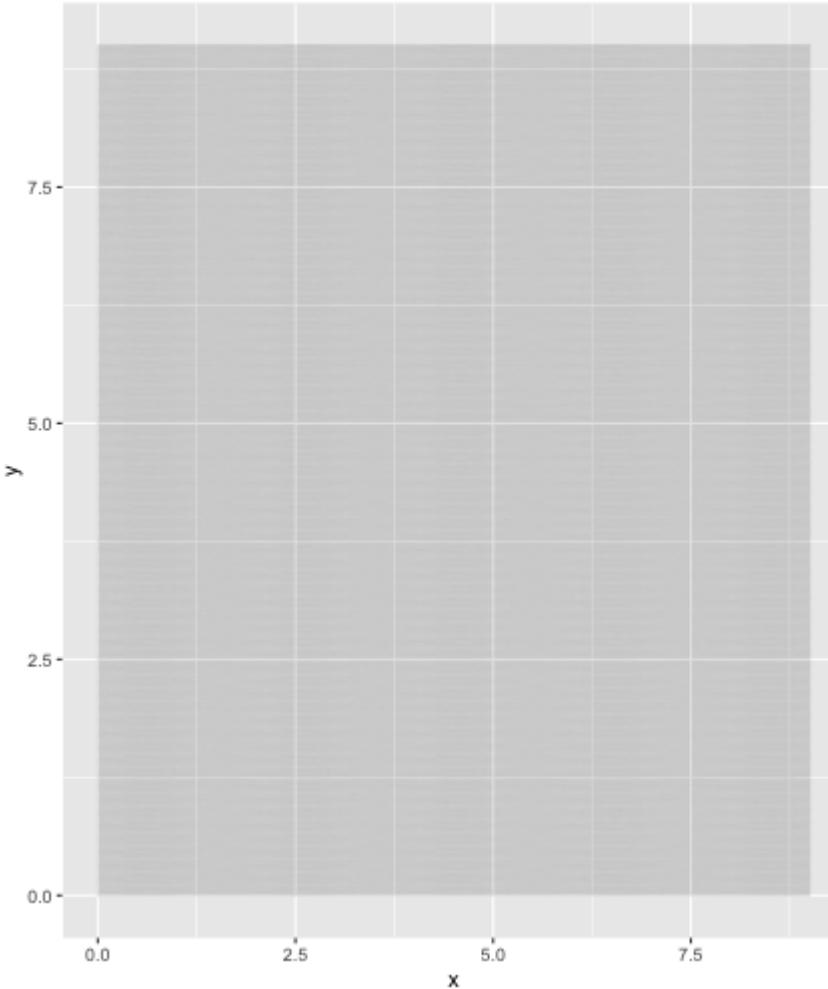
```
seq(0,9, by = 0.025) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot()
```



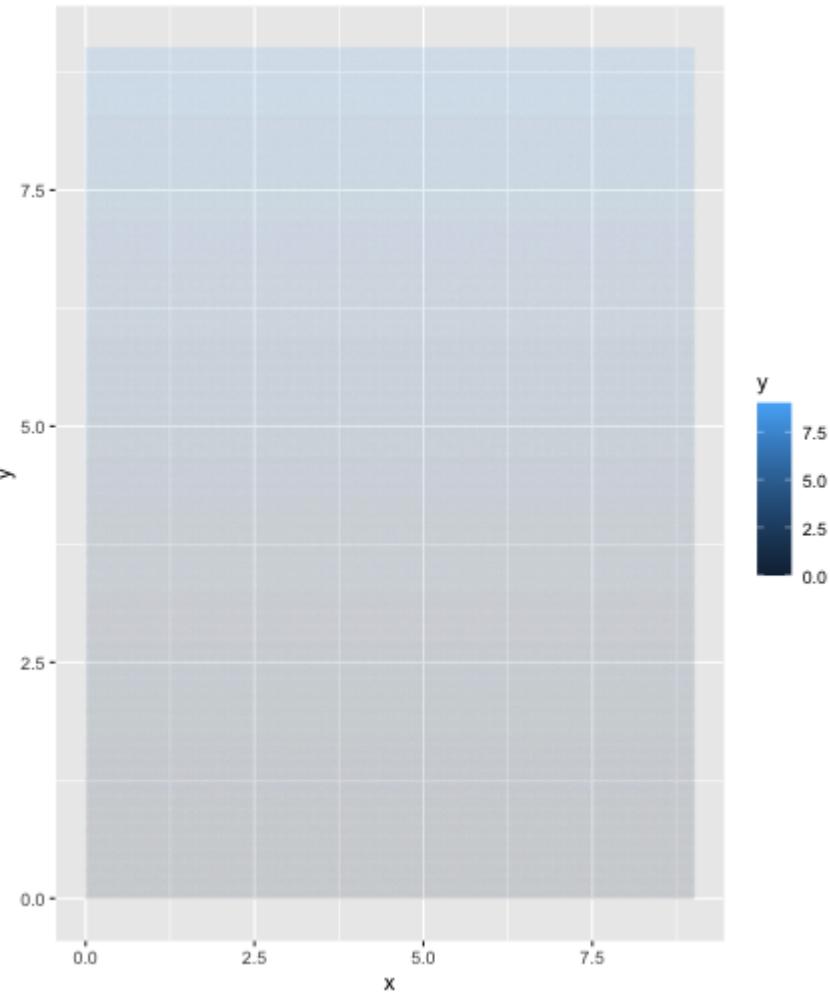
```
seq(0, 9, by = 0.025) ->  
  my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot() +  
  aes(x = x, y = y)
```



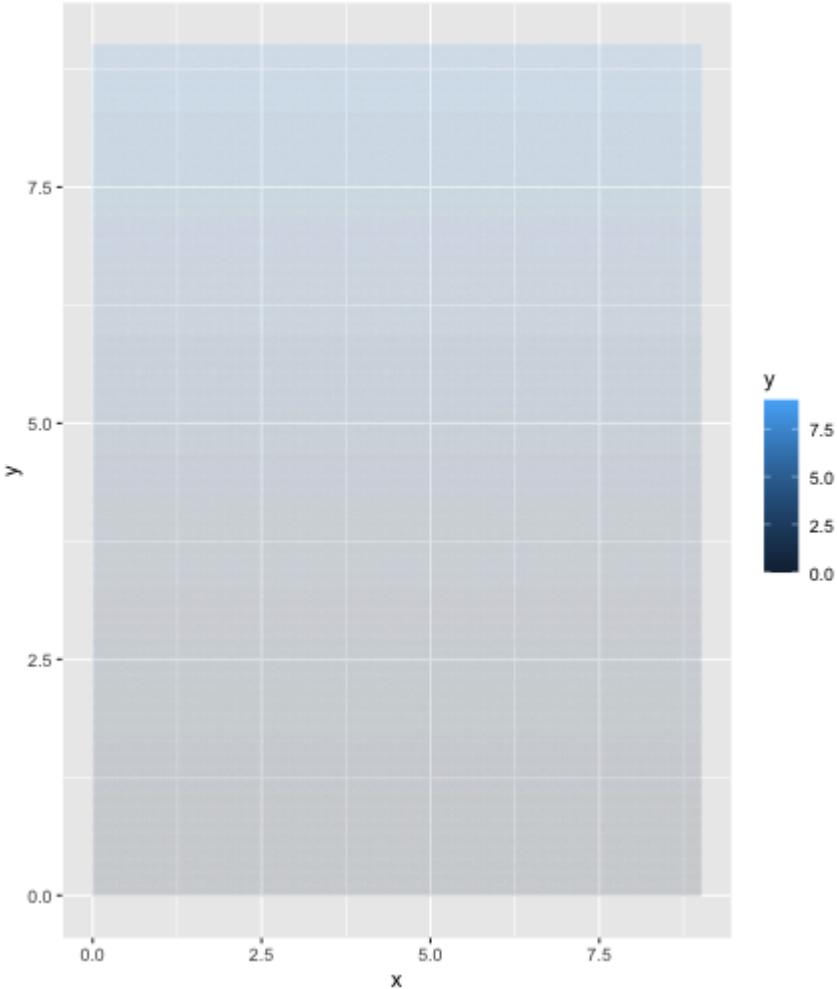
```
seq(0,9, by = 0.025) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x, y = y) +  
geom_point(size = 0, alpha = .05)
```



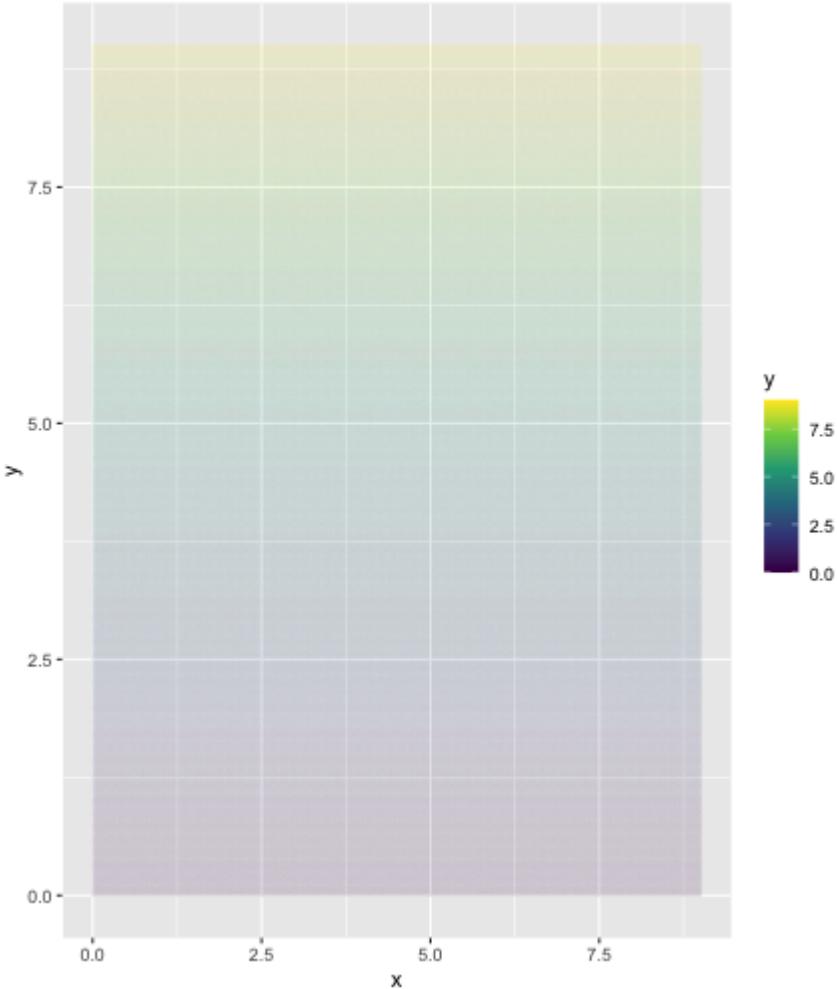
```
seq(0,9, by = 0.025) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x, y = y) +  
geom_point(size = 0, alpha = .05) +  
aes(color = y)
```



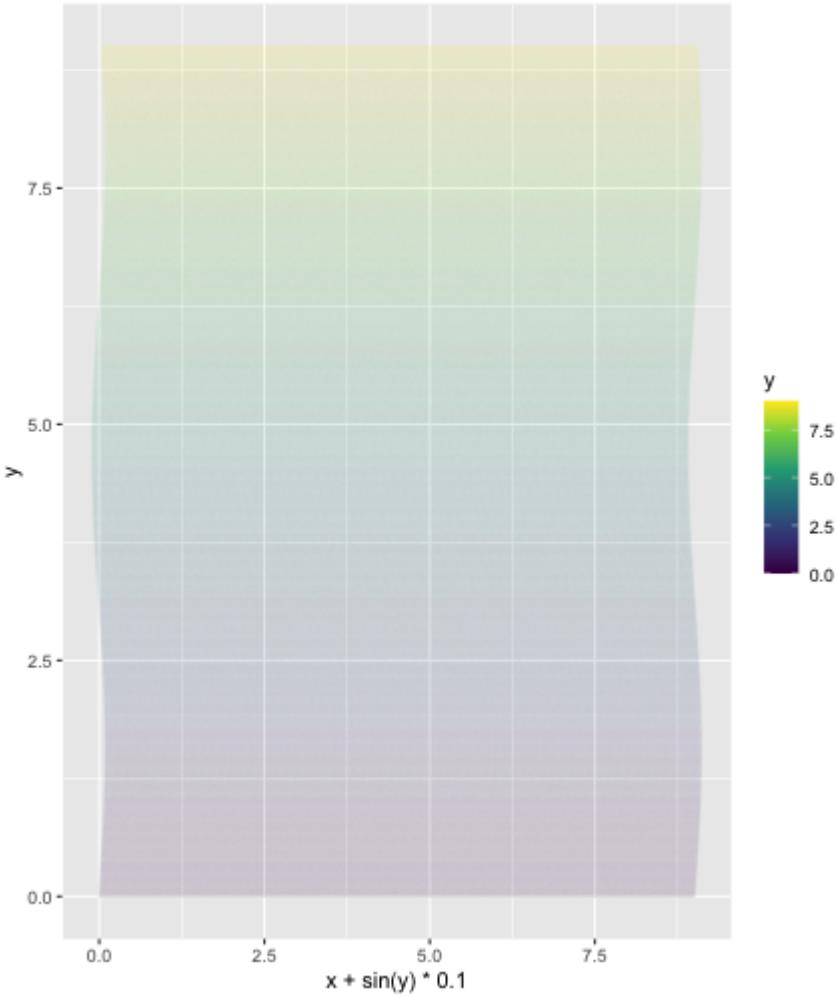
```
seq(0,9, by = 0.025) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x, y = y) +  
geom_point(size = 0, alpha = .05) +  
aes(color = y) +  
aes(alpha = x)
```



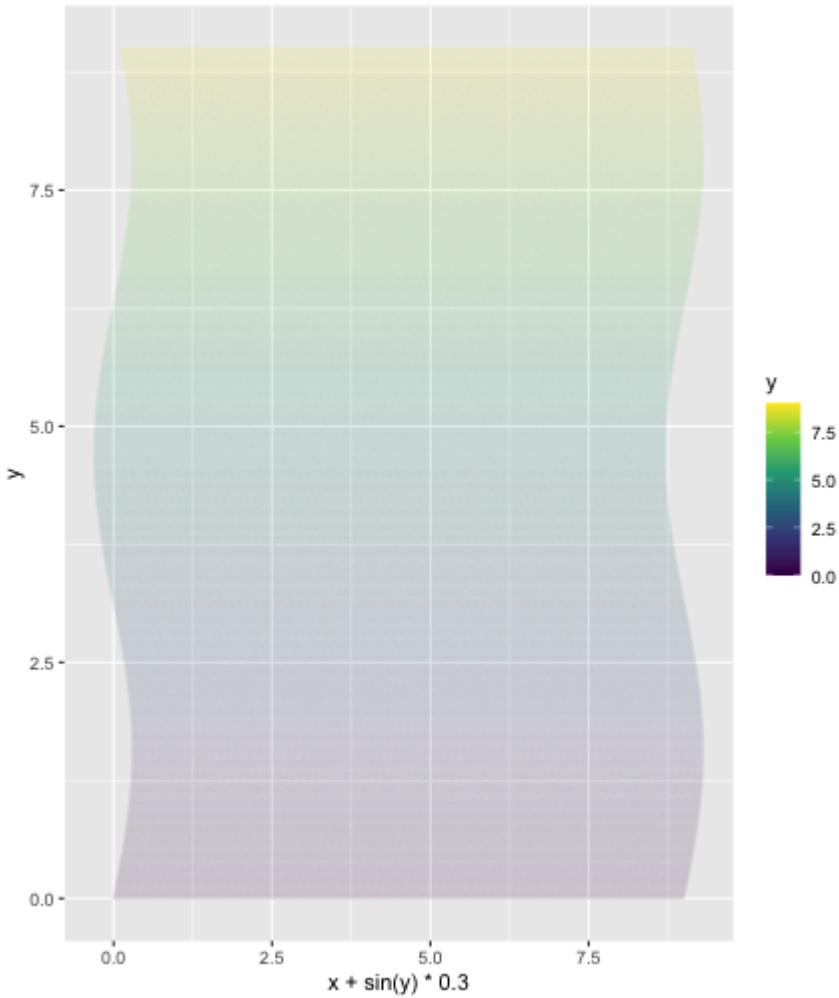
```
seq(0,9, by = 0.025) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x, y = y) +  
geom_point(size = 0, alpha = .05) +  
aes(color = y) +  
aes(alpha = x) +  
scale_color_viridis_c()
```



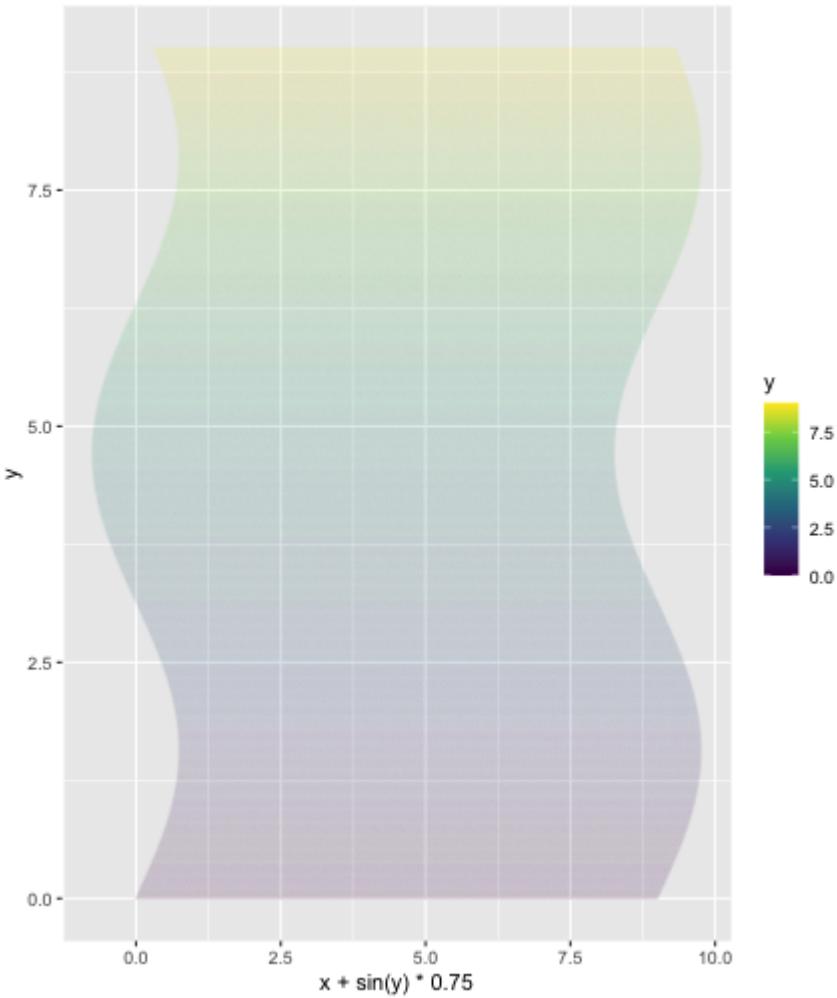
```
seq(0,9, by = 0.025) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x, y = y) +  
geom_point(size = 0, alpha = .05) +  
aes(color = y) +  
aes(alpha = x) +  
scale_color_viridis_c() +  
aes(x = x + sin(y)*.1)
```



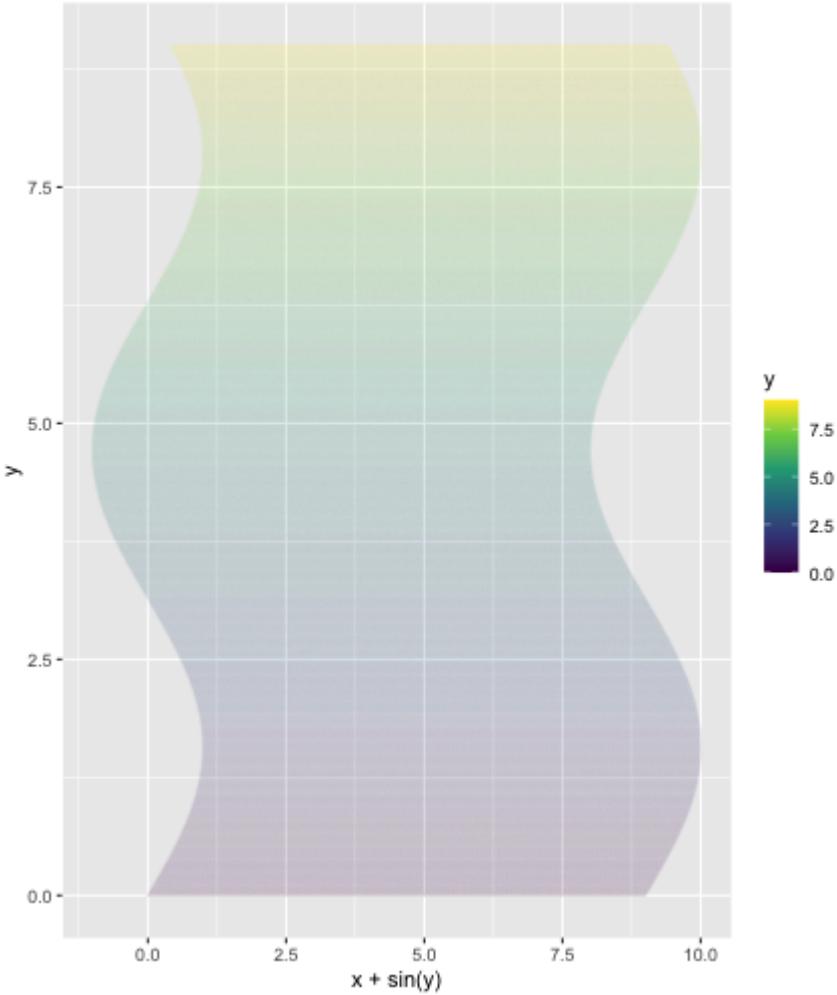
```
seq(0,9, by = 0.025) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x, y = y) +  
geom_point(size = 0, alpha = .05) +  
aes(color = y) +  
aes(alpha = x) +  
scale_color_viridis_c() +  
aes(x = x + sin(y)*.1) +  
aes(x = x + sin(y)*.3)
```



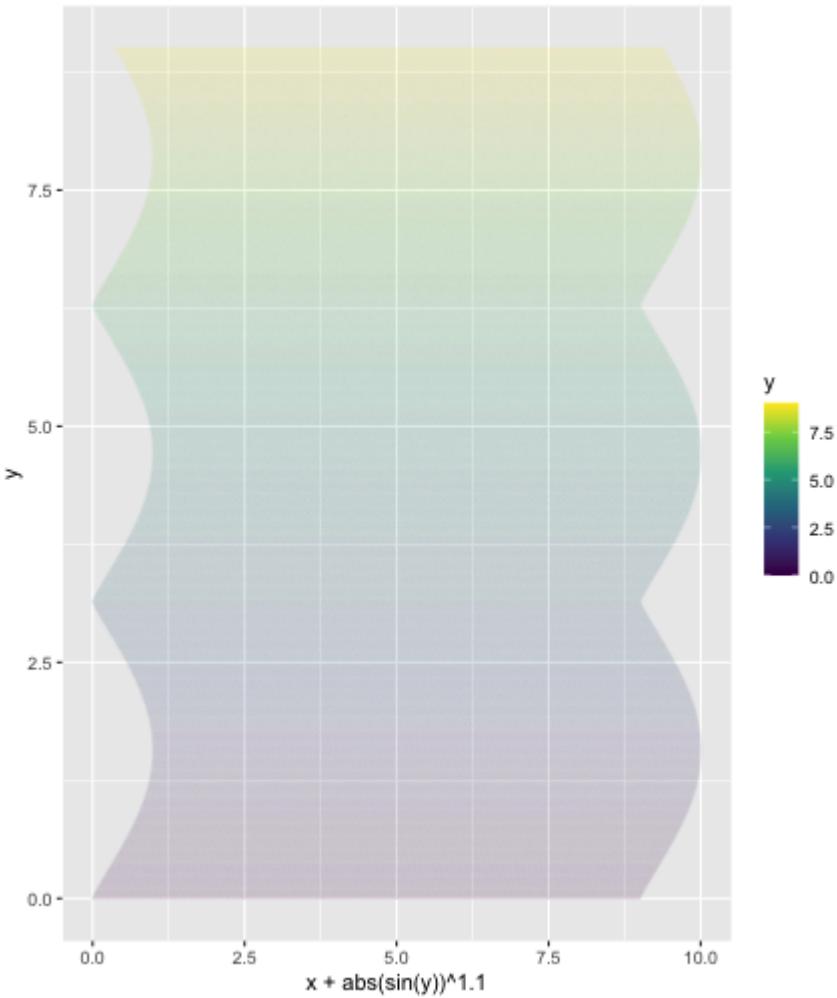
```
seq(0, 9, by = 0.025) ->  
  my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot() +  
  aes(x = x, y = y) +  
  geom_point(size = 0, alpha = .05) +  
  aes(color = y) +  
  aes(alpha = x) +  
  scale_color_viridis_c() +  
  aes(x = x + sin(y)*.1) +  
  aes(x = x + sin(y)*.3) +  
  aes(x = x + sin(y)*.75)
```



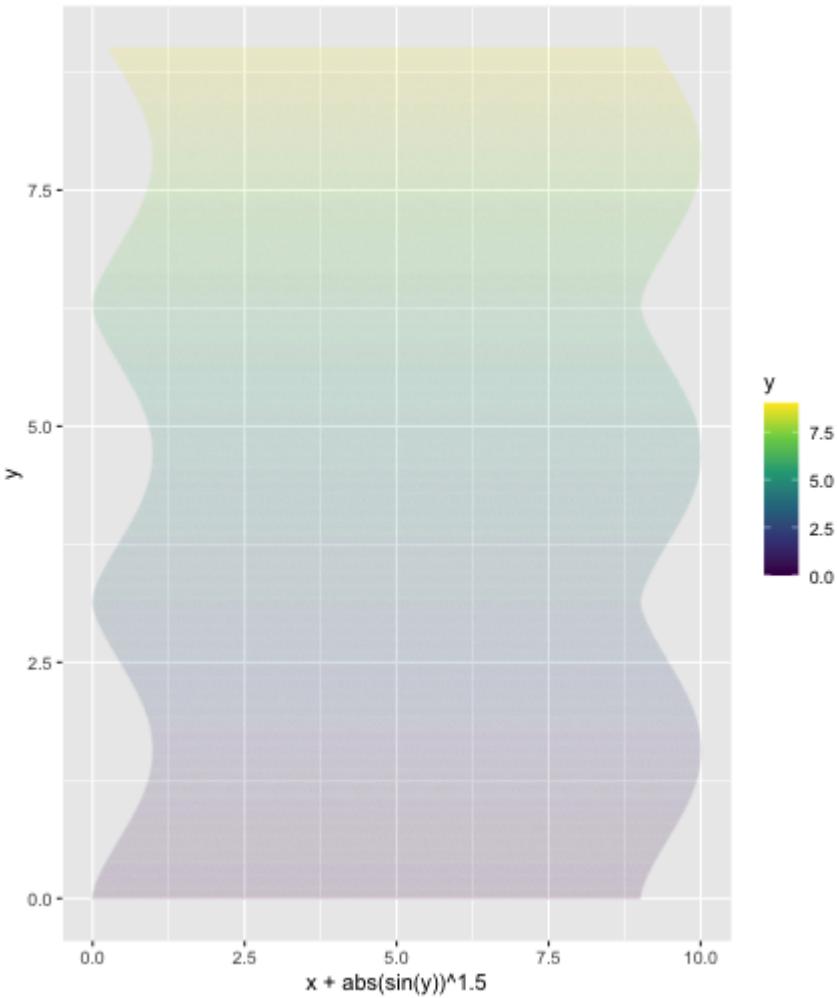
```
seq(0,9, by = 0.025) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x, y = y) +  
geom_point(size = 0, alpha = .05) +  
aes(color = y) +  
aes(alpha = x) +  
scale_color_viridis_c() +  
aes(x = x + sin(y)*.1) +  
aes(x = x + sin(y)*.3) +  
aes(x = x + sin(y)*.75) +  
aes(x = x + sin(y))
```



```
seq(0, 9, by = 0.025) ->  
  my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot() +  
  aes(x = x, y = y) +  
  geom_point(size = 0, alpha = .05) +  
  aes(color = y) +  
  aes(alpha = x) +  
  scale_color_viridis_c() +  
  aes(x = x + sin(y)*.1) +  
  aes(x = x + sin(y)*.3) +  
  aes(x = x + sin(y)*.75) +  
  aes(x = x + sin(y)) +  
  aes(x = x + abs(sin(y))^1.1)
```



```
seq(0,9, by = 0.025) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x, y = y) +  
geom_point(size = 0, alpha = .05) +  
aes(color = y) +  
aes(alpha = x) +  
scale_color_viridis_c() +  
aes(x = x + sin(y)*.1) +  
aes(x = x + sin(y)*.3) +  
aes(x = x + sin(y)*.75) +  
aes(x = x + sin(y)) +  
aes(x = x + abs(sin(y))^1.1) +  
aes(x = x + abs(sin(y))^1.5)
```

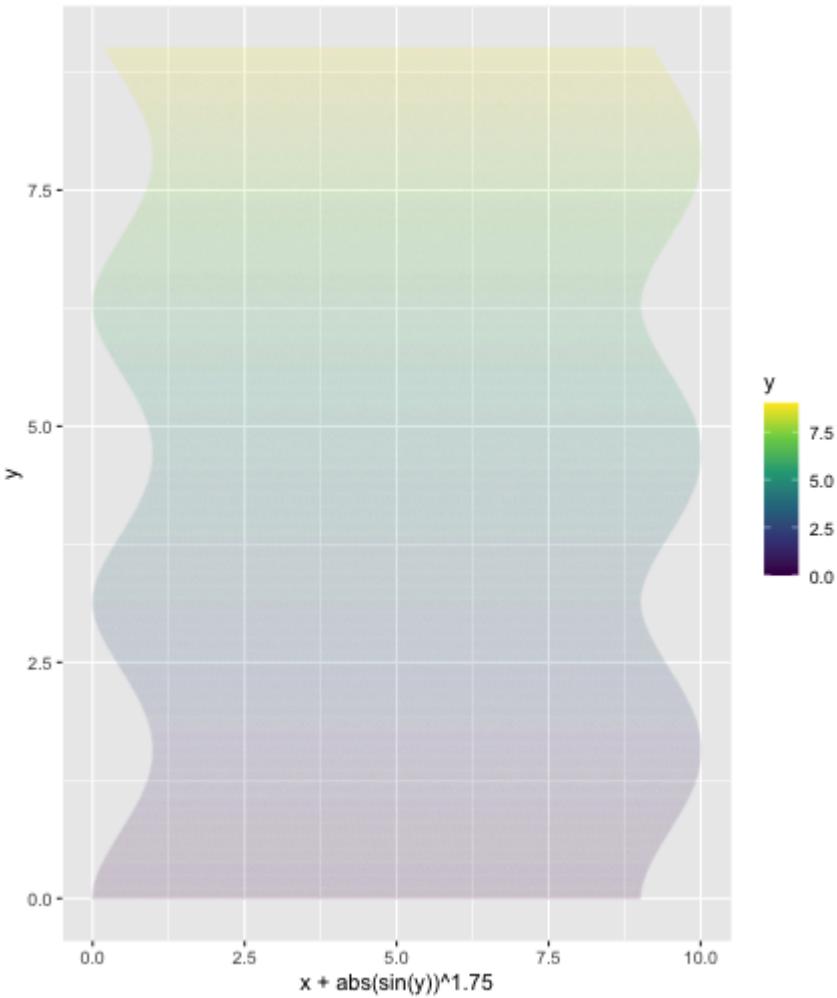


```

seq(0,9, by = 0.025) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x, y = y) +
  geom_point(size = 0, alpha = .05) +
  aes(color = y) +
  aes(alpha = x) +
  scale_color_viridis_c() +
  aes(x = x + sin(y)*.1) +
  aes(x = x + sin(y)*.3) +
  aes(x = x + sin(y)*.75) +
  aes(x = x + sin(y)) +
  aes(x = x + abs(sin(y))^1.1) +
  aes(x = x + abs(sin(y))^1.5) +
  aes(x = x + abs(sin(y))^1.75)

```

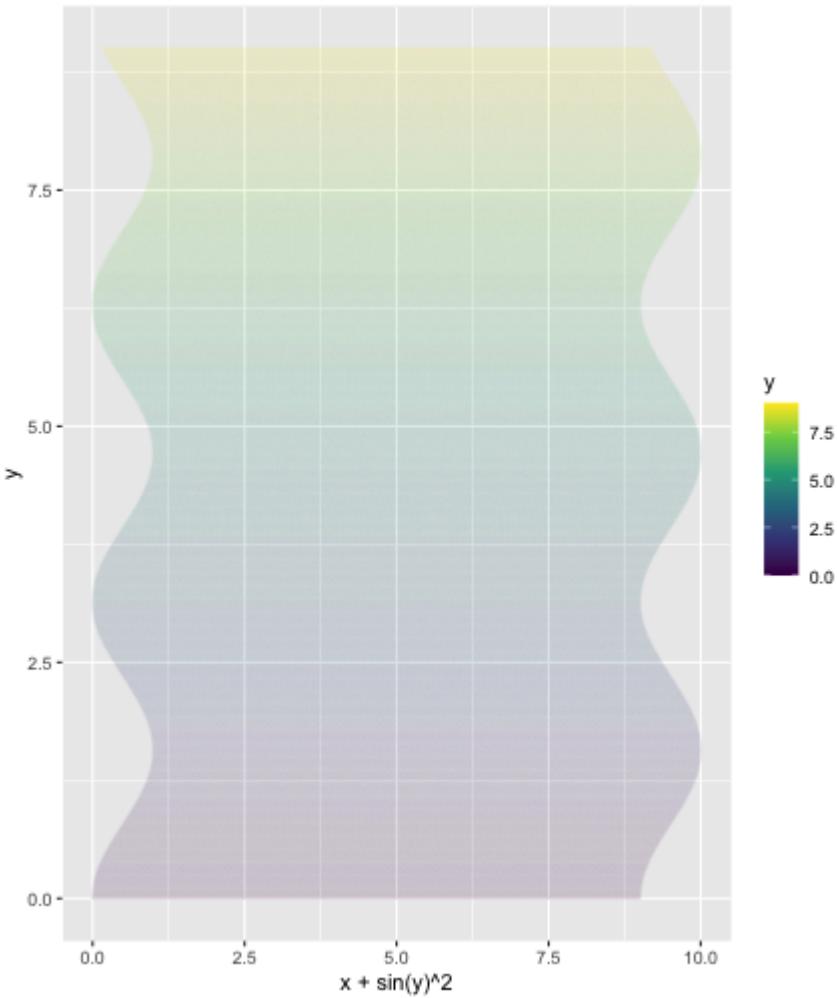


```

seq(0, 9, by = 0.025) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x, y = y) +
  geom_point(size = 0, alpha = .05) +
  aes(color = y) +
  aes(alpha = x) +
  scale_color_viridis_c() +
  aes(x = x + sin(y)*.1) +
  aes(x = x + sin(y)*.3) +
  aes(x = x + sin(y)*.75) +
  aes(x = x + sin(y)) +
  aes(x = x + abs(sin(y))^1.1) +
  aes(x = x + abs(sin(y))^1.5) +
  aes(x = x + abs(sin(y))^1.75) +
  aes(x = x + sin(y)^2)

```

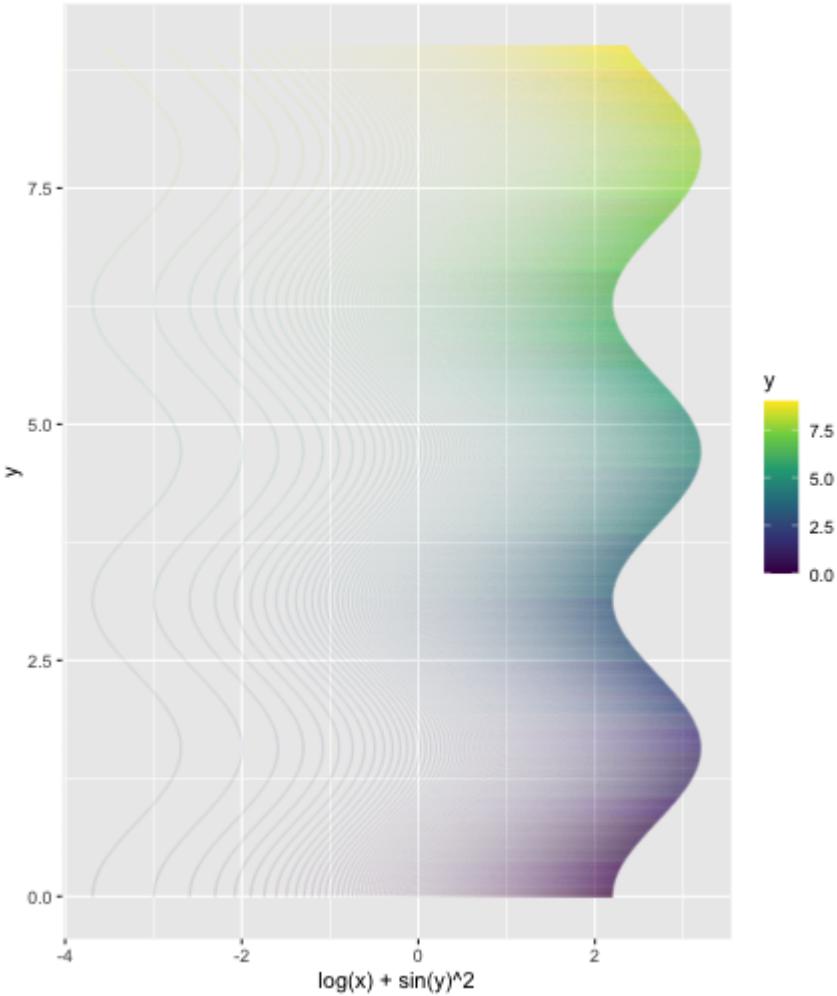


```

seq(0,9, by = 0.025) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x, y = y) +
  geom_point(size = 0, alpha = .05) +
  aes(color = y) +
  aes(alpha = x) +
  scale_color_viridis_c() +
  aes(x = x + sin(y)*.1) +
  aes(x = x + sin(y)*.3) +
  aes(x = x + sin(y)*.75) +
  aes(x = x + sin(y)) +
  aes(x = x + abs(sin(y))^1.1) +
  aes(x = x + abs(sin(y))^1.5) +
  aes(x = x + abs(sin(y))^1.75) +
  aes(x = x + sin(y)^2) +
  aes(x = log(x) + sin(y)^2)

```

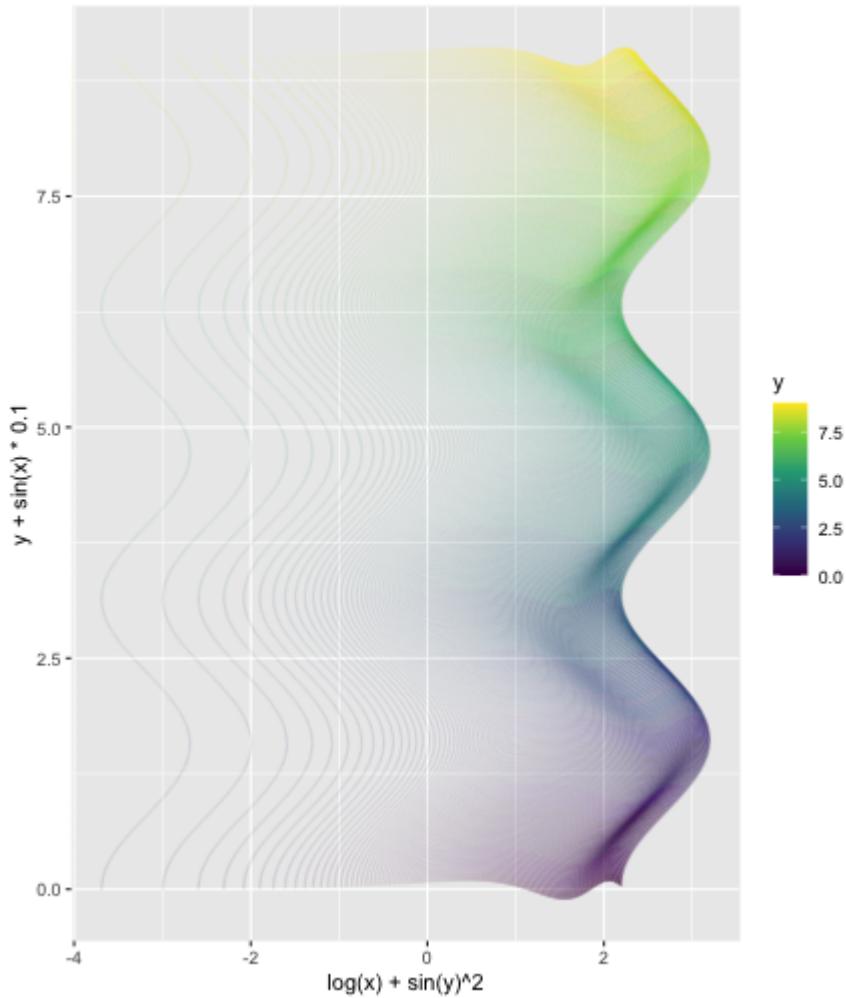


```

seq(0,9, by = 0.025) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x, y = y) +
  geom_point(size = 0, alpha = .05) +
  aes(color = y) +
  aes(alpha = x) +
  scale_color_viridis_c() +
  aes(x = x + sin(y)*.1) +
  aes(x = x + sin(y)*.3) +
  aes(x = x + sin(y)*.75) +
  aes(x = x + sin(y)) +
  aes(x = x + abs(sin(y))^1.1) +
  aes(x = x + abs(sin(y))^1.5) +
  aes(x = x + abs(sin(y))^1.75) +
  aes(x = x + sin(y)^2) +
  aes(x = log(x) + sin(y)^2) +
  aes(y = y + sin(x)*.1)

```

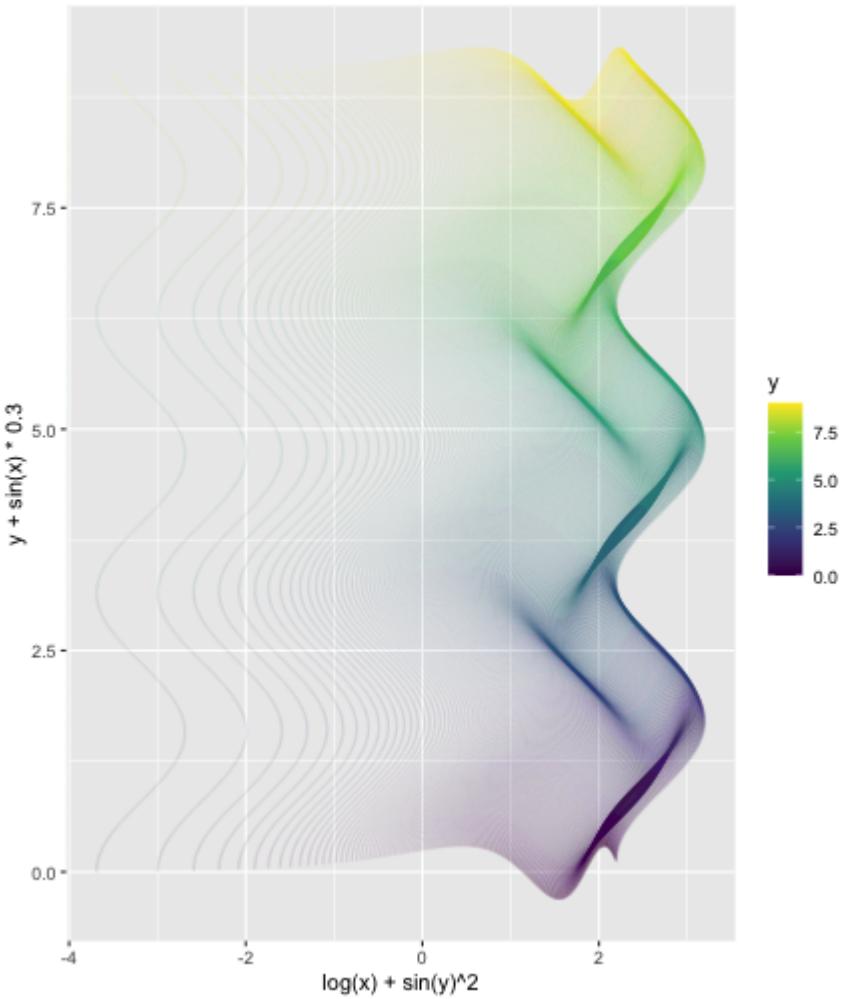


```

seq(0,9, by = 0.025) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x, y = y) +
  geom_point(size = 0, alpha = .05) +
  aes(color = y) +
  aes(alpha = x) +
  scale_color_viridis_c() +
  aes(x = x + sin(y)*.1) +
  aes(x = x + sin(y)*.3) +
  aes(x = x + sin(y)*.75) +
  aes(x = x + sin(y)) +
  aes(x = x + abs(sin(y))^1.1) +
  aes(x = x + abs(sin(y))^1.5) +
  aes(x = x + abs(sin(y))^1.75) +
  aes(x = x + sin(y)^2) +
  aes(x = log(x) + sin(y)^2) +
  aes(y = y + sin(x)*.1) +
  aes(y = y + sin(x)*.3)

```

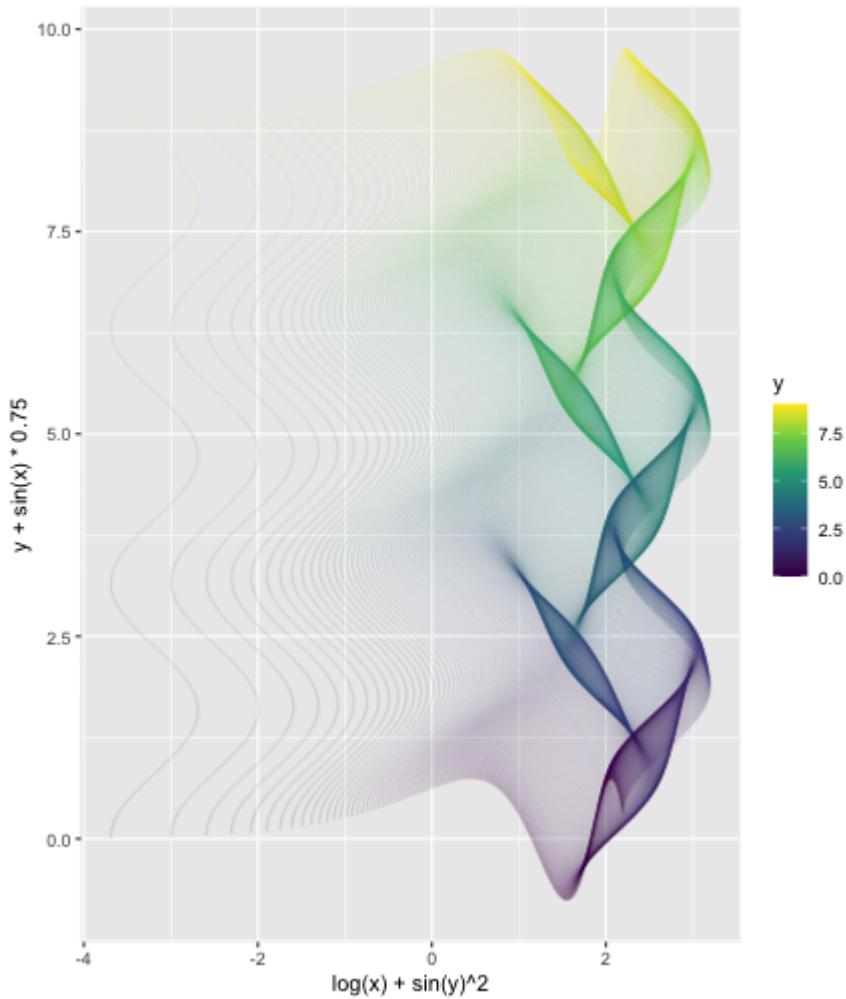


```

seq(0, 9, by = 0.025) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x, y = y) +
  geom_point(size = 0, alpha = .05) +
  aes(color = y) +
  aes(alpha = x) +
  scale_color_viridis_c() +
  aes(x = x + sin(y)*.1) +
  aes(x = x + sin(y)*.3) +
  aes(x = x + sin(y)*.75) +
  aes(x = x + sin(y)) +
  aes(x = x + abs(sin(y))^1.1) +
  aes(x = x + abs(sin(y))^1.5) +
  aes(x = x + abs(sin(y))^1.75) +
  aes(x = x + sin(y)^2) +
  aes(x = log(x) + sin(y)^2) +
  aes(y = y + sin(x)*.1) +
  aes(y = y + sin(x)*.3) +
  aes(y = y + sin(x)*.75)

```

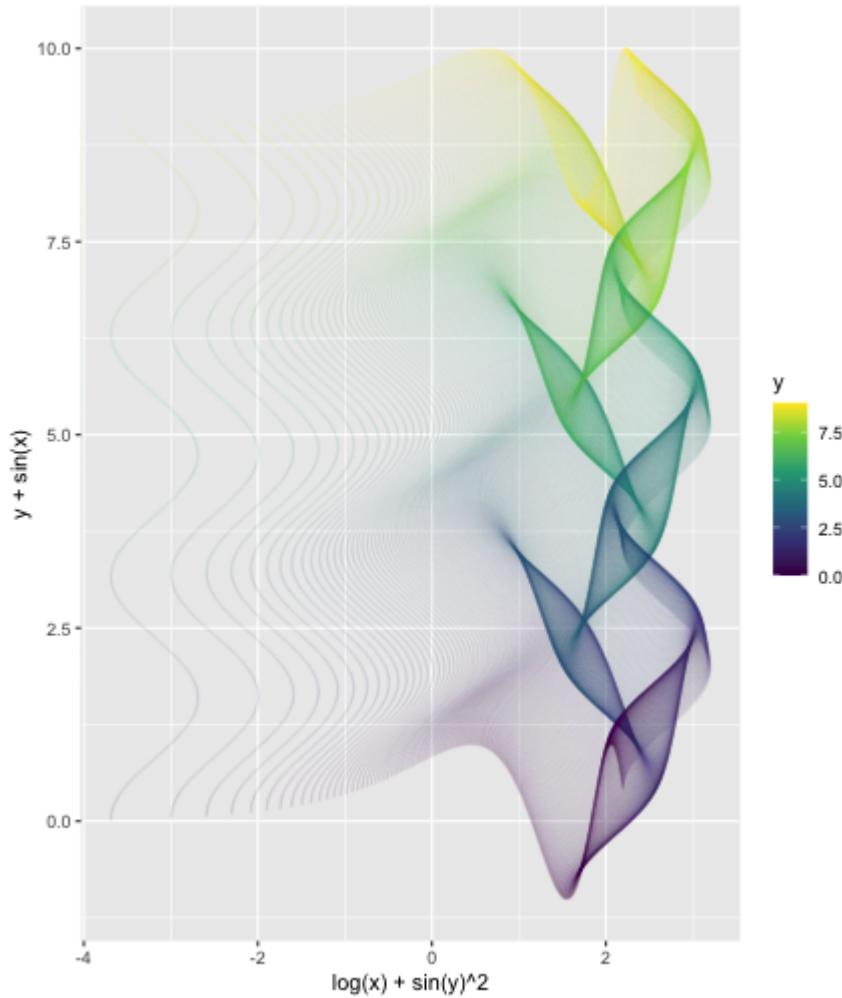


```

seq(0, 9, by = 0.025) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x, y = y) +
  geom_point(size = 0, alpha = .05) +
  aes(color = y) +
  aes(alpha = x) +
  scale_color_viridis_c() +
  aes(x = x + sin(y)*.1) +
  aes(x = x + sin(y)*.3) +
  aes(x = x + sin(y)*.75) +
  aes(x = x + sin(y)) +
  aes(x = x + abs(sin(y))^1.1) +
  aes(x = x + abs(sin(y))^1.5) +
  aes(x = x + abs(sin(y))^1.75) +
  aes(x = x + sin(y)^2) +
  aes(x = log(x) + sin(y)^2) +
  aes(y = y + sin(x)*.1) +
  aes(y = y + sin(x)*.3) +
  aes(y = y + sin(x)*.75) +
  aes(y = y + sin(x))

```

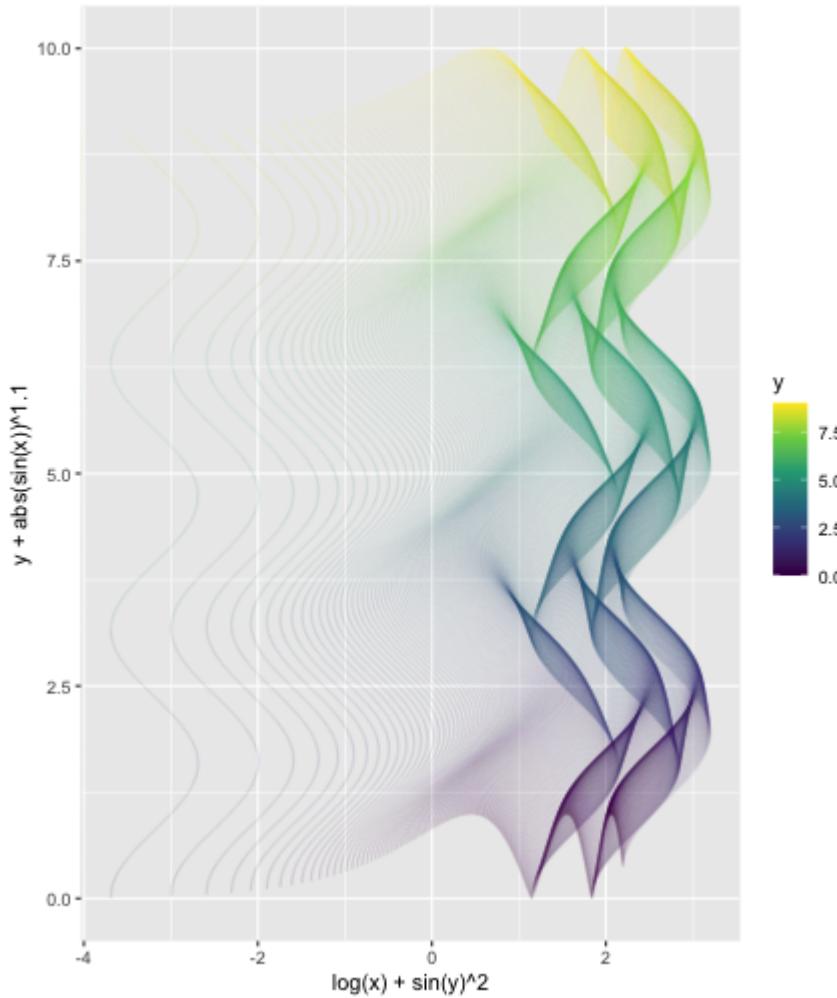


```

seq(0,9, by = 0.025) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x, y = y) +
  geom_point(size = 0, alpha = .05) +
  aes(color = y) +
  aes(alpha = x) +
  scale_color_viridis_c() +
  aes(x = x + sin(y)*.1) +
  aes(x = x + sin(y)*.3) +
  aes(x = x + sin(y)*.75) +
  aes(x = x + sin(y)) +
  aes(x = x + abs(sin(y))^1.1) +
  aes(x = x + abs(sin(y))^1.5) +
  aes(x = x + abs(sin(y))^1.75) +
  aes(x = x + sin(y)^2) +
  aes(x = log(x) + sin(y)^2) +
  aes(y = y + sin(x)*.1) +
  aes(y = y + sin(x)*.3) +
  aes(y = y + sin(x)*.75) +
  aes(y = y + sin(x)) +
  aes(y = y + abs(sin(x))^1.1)

```

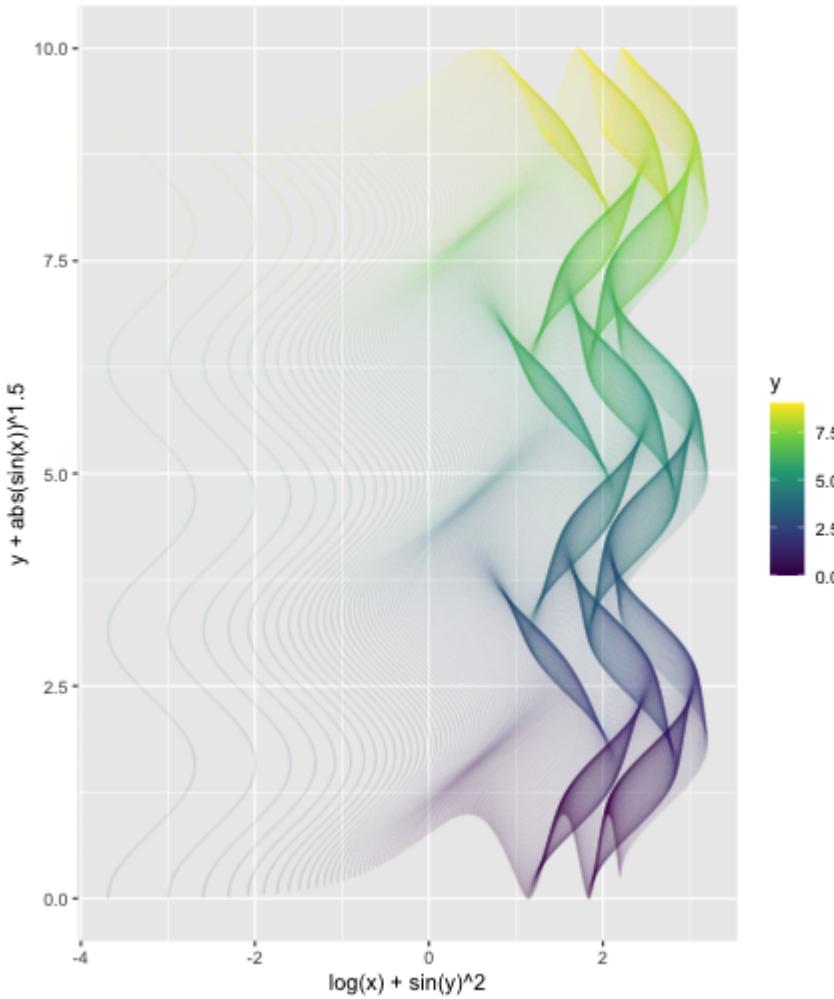


```

seq(0,9, by = 0.025) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x, y = y) +
  geom_point(size = 0, alpha = .05) +
  aes(color = y) +
  aes(alpha = x) +
  scale_color_viridis_c() +
  aes(x = x + sin(y)*.1) +
  aes(x = x + sin(y)*.3) +
  aes(x = x + sin(y)*.75) +
  aes(x = x + sin(y)) +
  aes(x = x + abs(sin(y))^1.1) +
  aes(x = x + abs(sin(y))^1.5) +
  aes(x = x + abs(sin(y))^1.75) +
  aes(x = x + sin(y)^2) +
  aes(x = log(x) + sin(y)^2) +
  aes(y = y + sin(x)*.1) +
  aes(y = y + sin(x)*.3) +
  aes(y = y + sin(x)*.75) +
  aes(y = y + sin(x)) +
  aes(y = y + abs(sin(x))^1.1) +
  aes(y = y + abs(sin(x))^1.5)

```

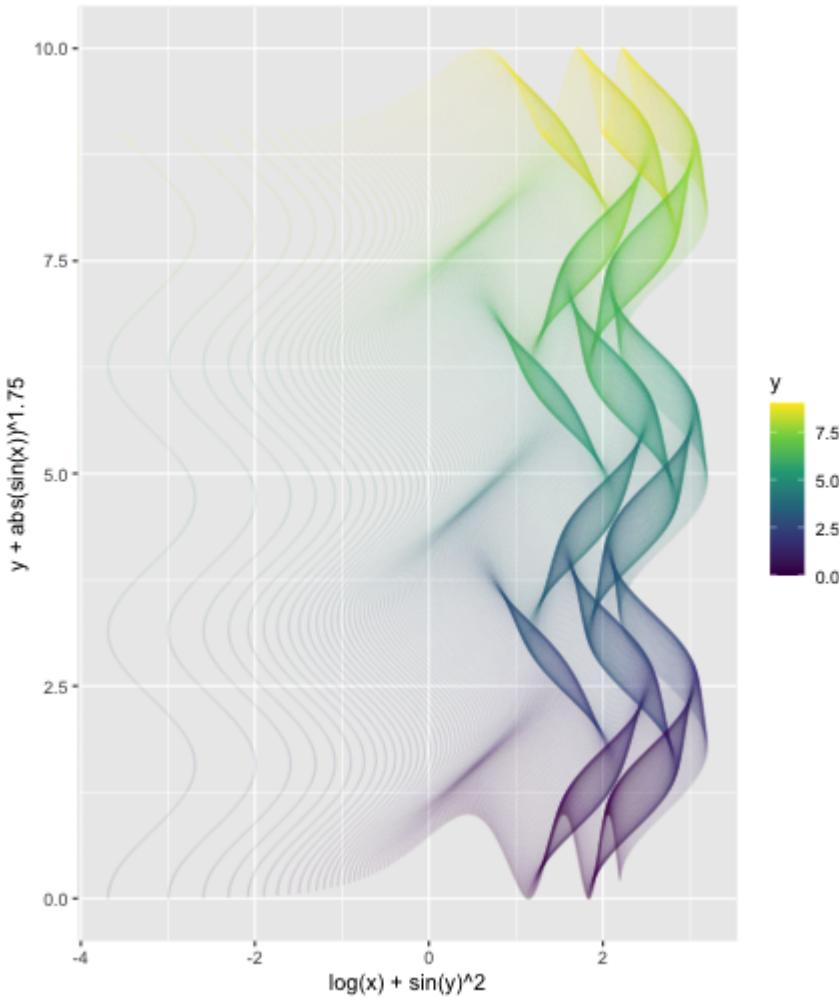


```

seq(0,9, by = 0.025) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x, y = y) +
  geom_point(size = 0, alpha = .05) +
  aes(color = y) +
  aes(alpha = x) +
  scale_color_viridis_c() +
  aes(x = x + sin(y)*.1) +
  aes(x = x + sin(y)*.3) +
  aes(x = x + sin(y)*.75) +
  aes(x = x + sin(y)) +
  aes(x = x + abs(sin(y))^1.1) +
  aes(x = x + abs(sin(y))^1.5) +
  aes(x = x + abs(sin(y))^1.75) +
  aes(x = x + sin(y)^2) +
  aes(x = log(x) + sin(y)^2) +
  aes(y = y + sin(x)*.1) +
  aes(y = y + sin(x)*.3) +
  aes(y = y + sin(x)*.75) +
  aes(y = y + sin(x)) +
  aes(y = y + abs(sin(x))^1.1) +
  aes(y = y + abs(sin(x))^1.5) +
  aes(y = y + abs(sin(x))^1.75)

```

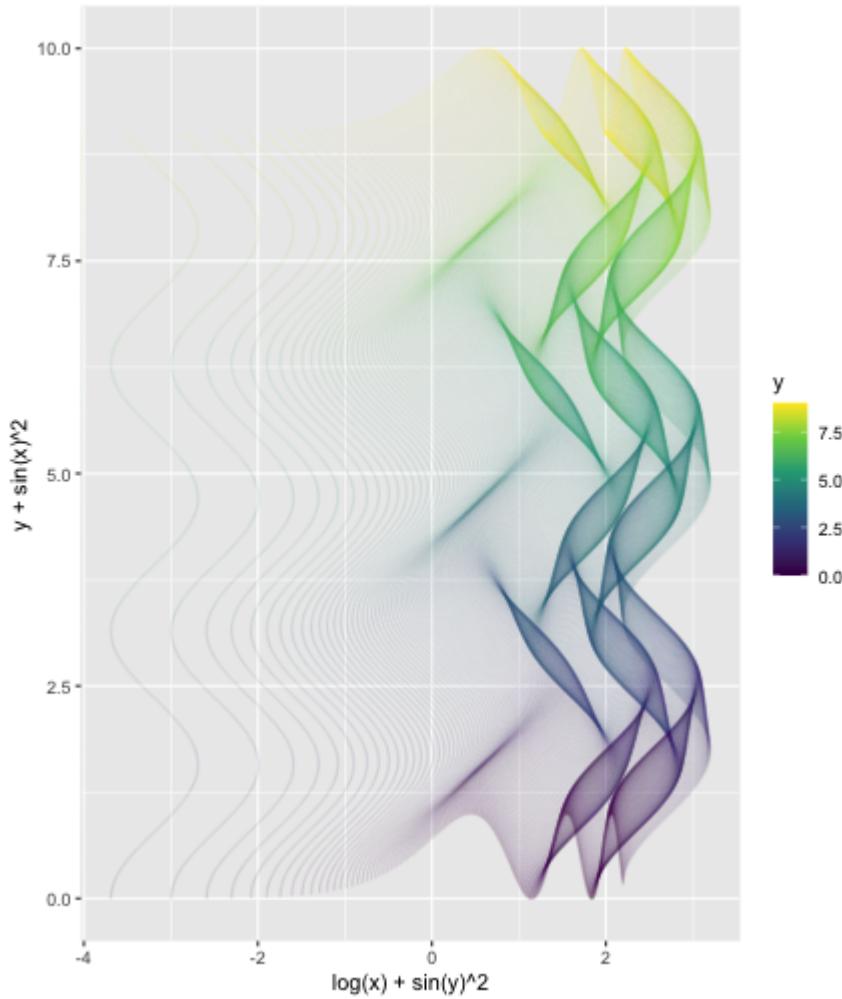


```

seq(0,9, by = 0.025) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x, y = y) +
  geom_point(size = 0, alpha = .05) +
  aes(color = y) +
  aes(alpha = x) +
  scale_color_viridis_c() +
  aes(x = x + sin(y)*.1) +
  aes(x = x + sin(y)*.3) +
  aes(x = x + sin(y)*.75) +
  aes(x = x + sin(y)) +
  aes(x = x + abs(sin(y))^1.1) +
  aes(x = x + abs(sin(y))^1.5) +
  aes(x = x + abs(sin(y))^1.75) +
  aes(x = x + sin(y)^2) +
  aes(x = log(x) + sin(y)^2) +
  aes(y = y + sin(x)*.1) +
  aes(y = y + sin(x)*.3) +
  aes(y = y + sin(x)*.75) +
  aes(y = y + sin(x)) +
  aes(y = y + abs(sin(x))^1.1) +
  aes(y = y + abs(sin(x))^1.5) +
  aes(y = y + abs(sin(x))^1.75) +
  aes(y = y + sin(x)^2)

```

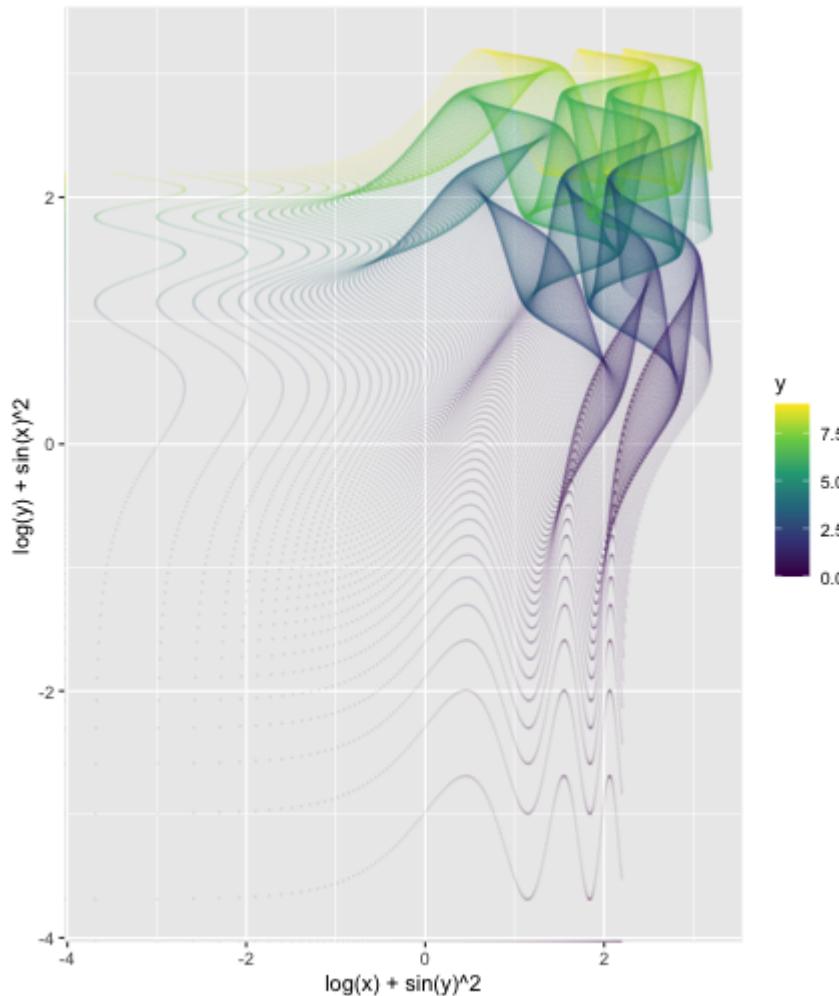


```

seq(0, 9, by = 0.025) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x, y = y) +
  geom_point(size = 0, alpha = .05) +
  aes(color = y) +
  aes(alpha = x) +
  scale_color_viridis_c() +
  aes(x = x + sin(y)*.1) +
  aes(x = x + sin(y)*.3) +
  aes(x = x + sin(y)*.75) +
  aes(x = x + sin(y)) +
  aes(x = x + abs(sin(y))^1.1) +
  aes(x = x + abs(sin(y))^1.5) +
  aes(x = x + abs(sin(y))^1.75) +
  aes(x = x + sin(y)^2) +
  aes(x = log(x) + sin(y)^2) +
  aes(y = y + sin(x)*.1) +
  aes(y = y + sin(x)*.3) +
  aes(y = y + sin(x)*.75) +
  aes(y = y + sin(x)) +
  aes(y = y + abs(sin(x))^1.1) +
  aes(y = y + abs(sin(x))^1.5) +
  aes(y = y + abs(sin(x))^1.75) +
  aes(y = y + sin(x)^2) +
  aes(y = log(y) + sin(x)^2)

```

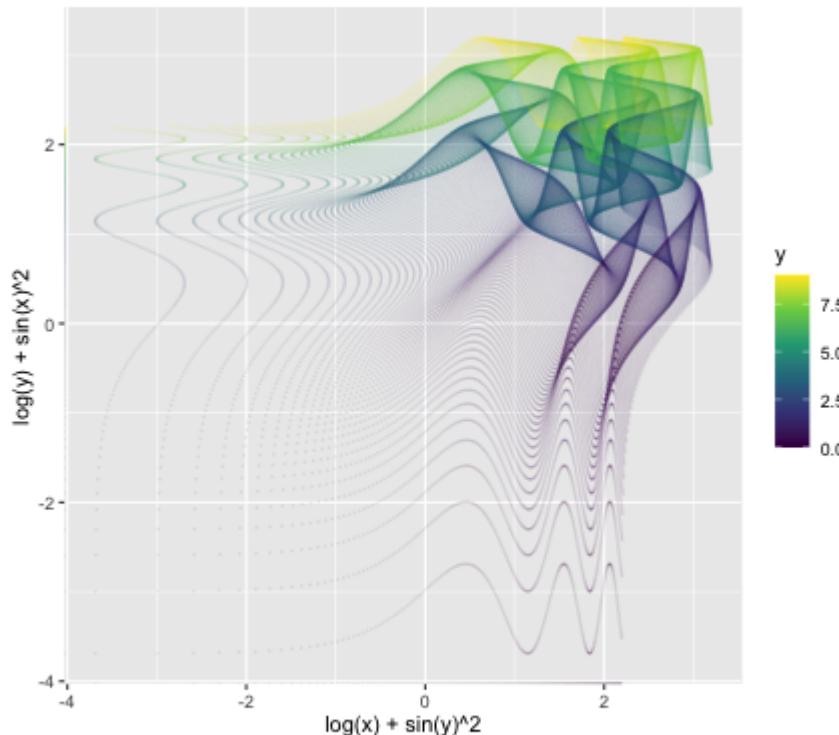


```

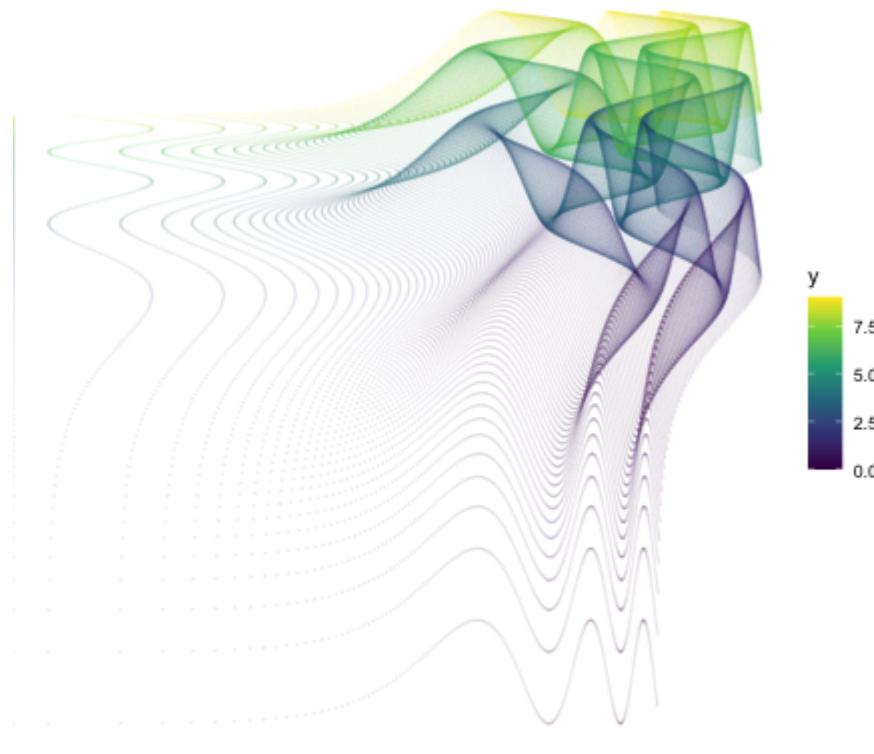
seq(0,9, by = 0.025) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x, y = y) +
  geom_point(size = 0, alpha = .05) +
  aes(color = y) +
  aes(alpha = x) +
  scale_color_viridis_c() +
  aes(x = x + sin(y)*.1) +
  aes(x = x + sin(y)*.3) +
  aes(x = x + sin(y)*.75) +
  aes(x = x + sin(y)) +
  aes(x = x + abs(sin(y))^1.1) +
  aes(x = x + abs(sin(y))^1.5) +
  aes(x = x + abs(sin(y))^1.75) +
  aes(x = x + sin(y)^2) +
  aes(x = log(x) + sin(y)^2) +
  aes(y = y + sin(x)*.1) +
  aes(y = y + sin(x)*.3) +
  aes(y = y + sin(x)*.75) +
  aes(y = y + sin(x)) +
  aes(y = y + abs(sin(x))^1.1) +
  aes(y = y + abs(sin(x))^1.5) +
  aes(y = y + abs(sin(x))^1.75) +
  aes(y = y + sin(x)^2) +
  aes(y = log(y) + sin(x)^2) +
  coord_equal()

```

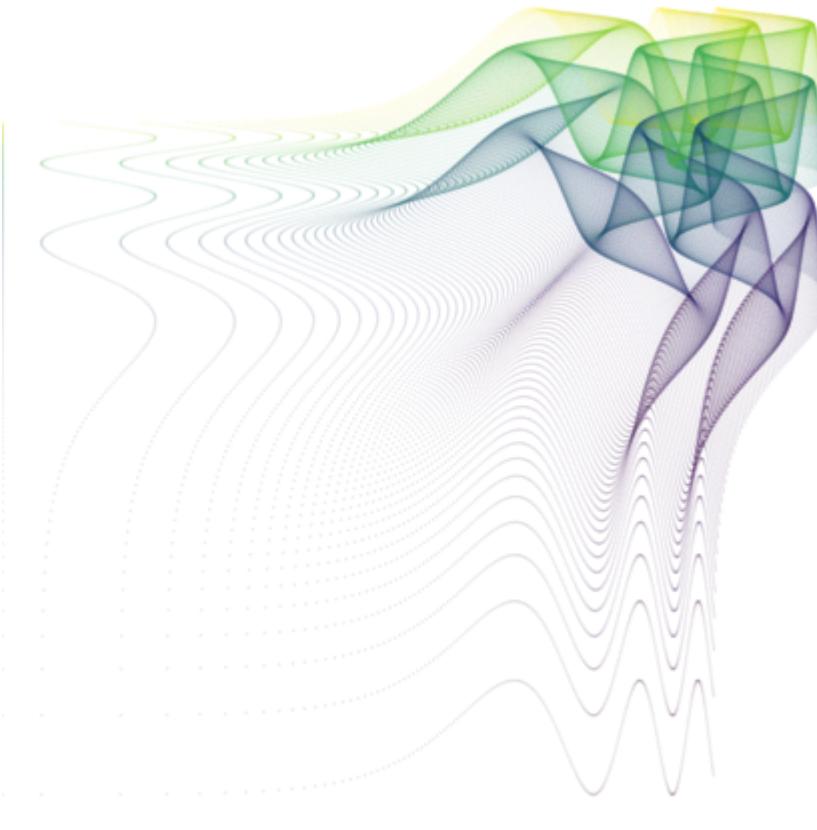


```
seq(0, 9, by = 0.025) ->  
  my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot() +  
  aes(x = x, y = y) +  
  geom_point(size = 0, alpha = .05) +  
  aes(color = y) +  
  aes(alpha = x) +  
  scale_color_viridis_c() +  
  aes(x = x + sin(y)*.1) +  
  aes(x = x + sin(y)*.3) +  
  aes(x = x + sin(y)*.75) +  
  aes(x = x + sin(y)) +  
  aes(x = x + abs(sin(y))^1.1) +  
  aes(x = x + abs(sin(y))^1.5) +  
  aes(x = x + abs(sin(y))^1.75) +  
  aes(x = x + sin(y)^2) +  
  aes(x = log(x) + sin(y)^2) +  
  aes(y = y + sin(x)*.1) +  
  aes(y = y + sin(x)*.3) +  
  aes(y = y + sin(x)*.75) +  
  aes(y = y + sin(x)) +  
  aes(y = y + abs(sin(x))^1.1) +  
  aes(y = y + abs(sin(x))^1.5) +  
  aes(y = y + abs(sin(x))^1.75) +  
  aes(y = y + sin(x)^2) +  
  aes(y = log(y) + sin(x)^2) +  
  coord_equal() +  
  theme_void()
```



```
seq(0, 9, by = 0.025) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x, y = y) +
  geom_point(size = 0, alpha = .05) +
  aes(color = y) +
  aes(alpha = x) +
  scale_color_viridis_c() +
  aes(x = x + sin(y)*.1) +
  aes(x = x + sin(y)*.3) +
  aes(x = x + sin(y)*.75) +
  aes(x = x + sin(y)) +
  aes(x = x + abs(sin(y))^1.1) +
  aes(x = x + abs(sin(y))^1.5) +
  aes(x = x + abs(sin(y))^1.75) +
  aes(x = x + sin(y)^2) +
  aes(x = log(x) + sin(y)^2) +
  aes(y = y + sin(x)*.1) +
  aes(y = y + sin(x)*.3) +
  aes(y = y + sin(x)*.75) +
  aes(y = y + sin(x)) +
  aes(y = y + abs(sin(x))^1.1) +
  aes(y = y + abs(sin(x))^1.5) +
  aes(y = y + abs(sin(x))^1.75) +
  aes(y = y + sin(x)^2) +
  aes(y = log(y) + sin(x)^2) +
  coord_equal() +
  theme_void() +
  theme(legend.position = "none")
```



another rose


```
seq(-12,12, by = 0.04)
```

```
[1] -12.00 -11.96 -11.92 -11.88 -11.84 -11.80 -11.76 -11.72 -11.68 -11.64  
[11] -11.60 -11.56 -11.52 -11.48 -11.44 -11.40 -11.36 -11.32 -11.28 -11.24  
[21] -11.20 -11.16 -11.12 -11.08 -11.04 -11.00 -10.96 -10.92 -10.88 -10.84  
[31] -10.80 -10.76 -10.72 -10.68 -10.64 -10.60 -10.56 -10.52 -10.48 -10.44  
[41] -10.40 -10.36 -10.32 -10.28 -10.24 -10.20 -10.16 -10.12 -10.08 -10.04  
[51] -10.00 -9.96 -9.92 -9.88 -9.84 -9.80 -9.76 -9.72 -9.68 -9.64  
[61] -9.60 -9.56 -9.52 -9.48 -9.44 -9.40 -9.36 -9.32 -9.28 -9.24  
[71] -9.20 -9.16 -9.12 -9.08 -9.04 -9.00 -8.96 -8.92 -8.88 -8.84  
[81] -8.80 -8.76 -8.72 -8.68 -8.64 -8.60 -8.56 -8.52 -8.48 -8.44  
[91] -8.40 -8.36 -8.32 -8.28 -8.24 -8.20 -8.16 -8.12 -8.08 -8.04  
[101] -8.00 -7.96 -7.92 -7.88 -7.84 -7.80 -7.76 -7.72 -7.68 -7.64  
[111] -7.60 -7.56 -7.52 -7.48 -7.44 -7.40 -7.36 -7.32 -7.28 -7.24  
[121] -7.20 -7.16 -7.12 -7.08 -7.04 -7.00 -6.96 -6.92 -6.88 -6.84  
[131] -6.80 -6.76 -6.72 -6.68 -6.64 -6.60 -6.56 -6.52 -6.48 -6.44  
[141] -6.40 -6.36 -6.32 -6.28 -6.24 -6.20 -6.16 -6.12 -6.08 -6.04  
[151] -6.00 -5.96 -5.92 -5.88 -5.84 -5.80 -5.76 -5.72 -5.68 -5.64  
[161] -5.60 -5.56 -5.52 -5.48 -5.44 -5.40 -5.36 -5.32 -5.28 -5.24  
[171] -5.20 -5.16 -5.12 -5.08 -5.04 -5.00 -4.96 -4.92 -4.88 -4.84  
[181] -4.80 -4.76 -4.72 -4.68 -4.64 -4.60 -4.56 -4.52 -4.48 -4.44  
[191] -4.40 -4.36 -4.32 -4.28 -4.24 -4.20 -4.16 -4.12 -4.08 -4.04  
[201] -4.00 -3.96 -3.92 -3.88 -3.84 -3.80 -3.76 -3.72 -3.68 -3.64  
[211] -3.60 -3.56 -3.52 -3.48 -3.44 -3.40 -3.36 -3.32 -3.28 -3.24  
[221] -3.20 -3.16 -3.12 -3.08 -3.04 -3.00 -2.96 -2.92 -2.88 -2.84  
[231] -2.80 -2.76 -2.72 -2.68 -2.64 -2.60 -2.56 -2.52 -2.48 -2.44  
[241] -2.40 -2.36 -2.32 -2.28 -2.24 -2.20 -2.16 -2.12 -2.08 -2.04  
[251] -2.00 -1.96 -1.92 -1.88 -1.84 -1.80 -1.76 -1.72 -1.68 -1.64  
[261] -1.60 -1.56 -1.52 -1.48 -1.44 -1.40 -1.36 -1.32 -1.28 -1.24  
[271] -1.20 -1.16 -1.12 -1.08 -1.04 -1.00 -0.96 -0.92 -0.88 -0.84  
[281] -0.80 -0.76 -0.72 -0.68 -0.64 -0.60 -0.56 -0.52 -0.48 -0.44  
[291] -0.40 -0.36 -0.32 -0.28 -0.24 -0.20 -0.16 -0.12 -0.08 -0.04  
[301] 0.00 0.04 0.08 0.12 0.16 0.20 0.24 0.28 0.32 0.36  
[311] 0.40 0.44 0.48 0.52 0.56 0.60 0.64 0.68 0.72 0.76  
[321] 0.80 0.84 0.88 0.92 0.96 1.00 1.04 1.08 1.12 1.16
```

```
seq(-12,12, by = 0.04) ->  
my_seq
```

```
seq(-12,12, by = 0.04) ->  
my_seq  
tibble(x = my_seq)
```

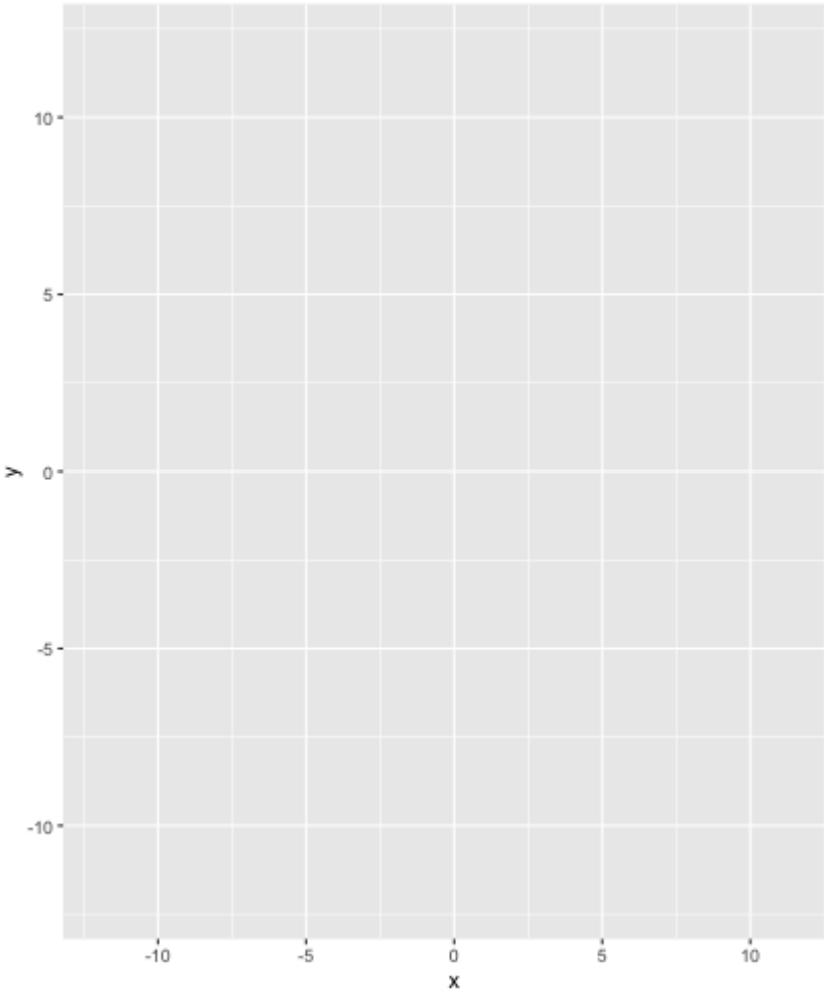
```
# A tibble: 601 x 1  
      x  
     <dbl>  
1  -12  
2  -12.0  
3  -11.9  
4  -11.9  
5  -11.8  
6  -11.8  
7  -11.8  
8  -11.7  
9  -11.7  
10 -11.6  
# ... with 591 more rows
```

```
seq(-12,12, by = 0.04) ->  
  my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq)
```

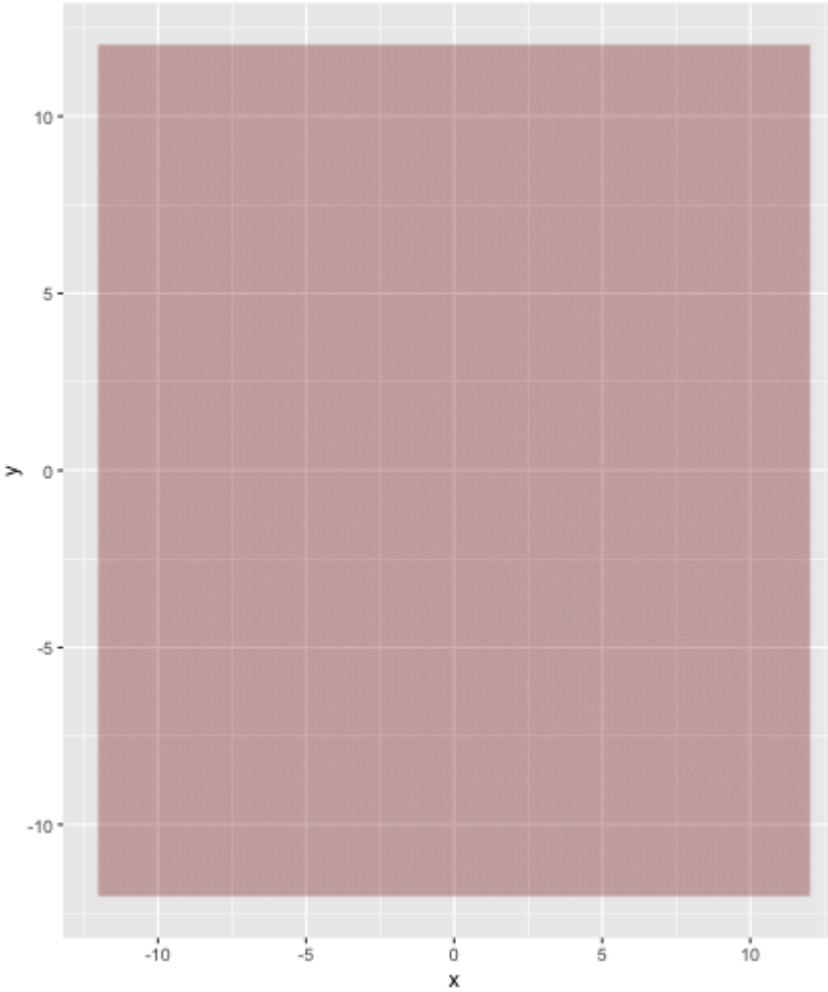
A tibble: 361,201 x 2
 x y
 <dbl> <dbl>
1 -12 -12
2 -12 -12.0
3 -12 -11.9
4 -12 -11.9
5 -12 -11.8
6 -12 -11.8
7 -12 -11.8
8 -12 -11.7
9 -12 -11.7
10 -12 -11.6
... with 361,191 more rows

```
seq(-12,12, by = 0.04) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot()
```

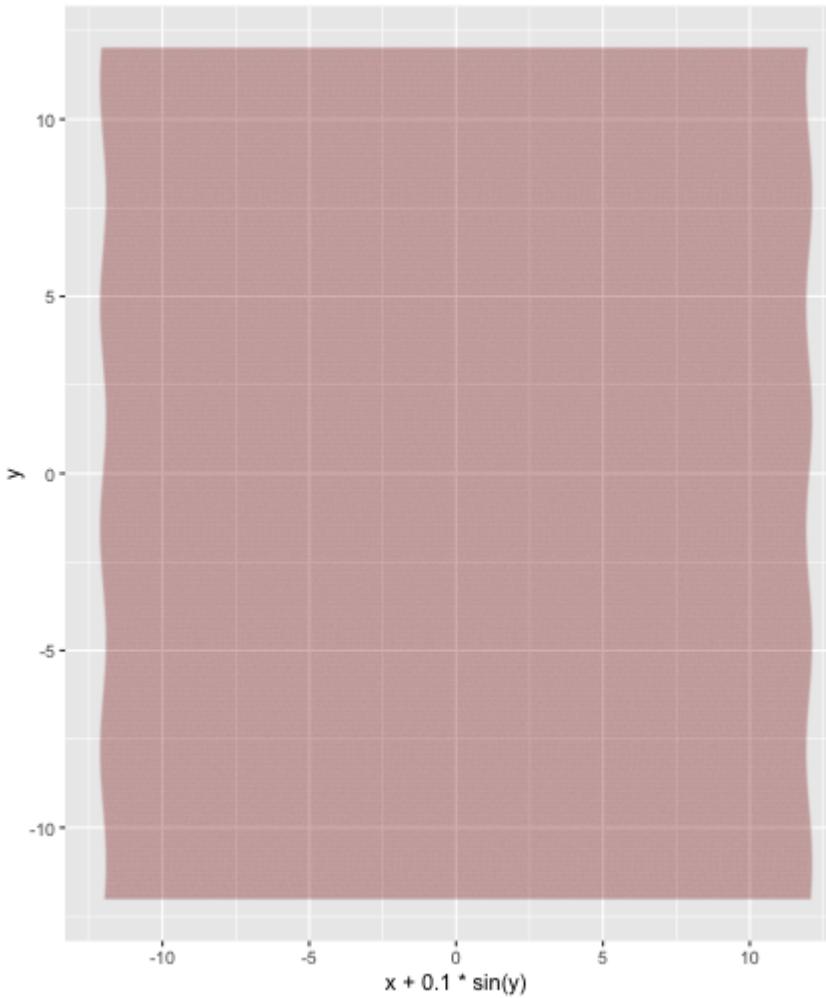
```
seq(-12,12, by = 0.04) ->  
my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot() +  
  aes(x = x, y = y)
```



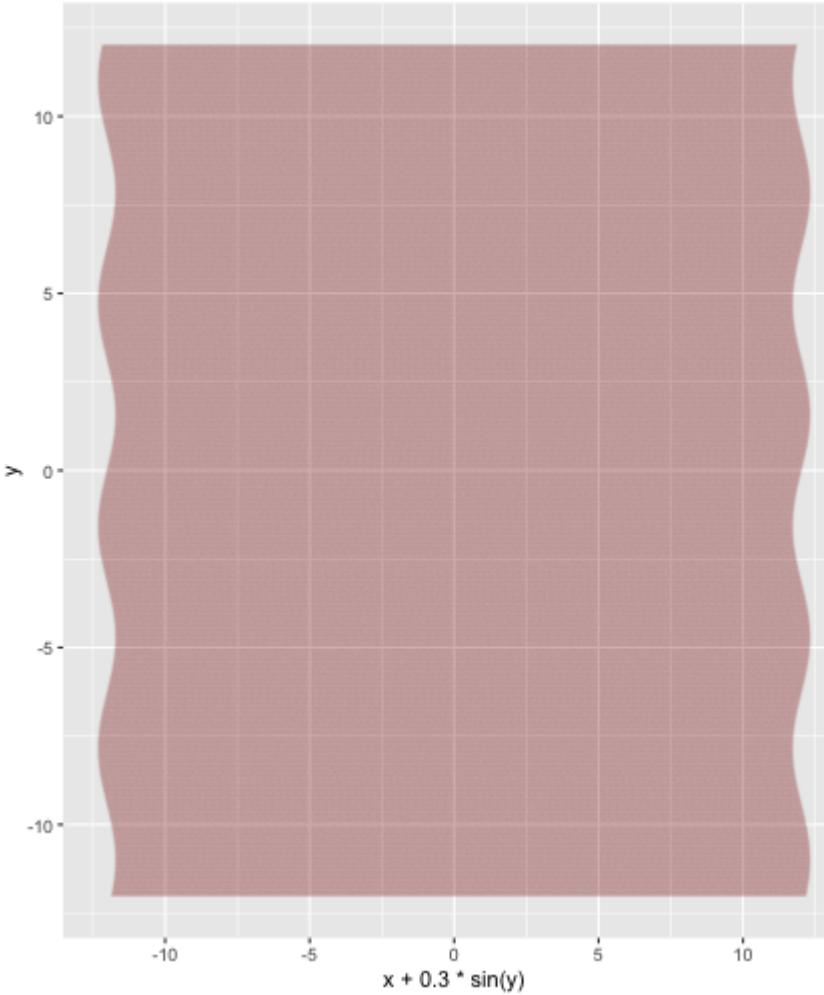
```
seq(-12,12, by = 0.04) ->  
  my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot() +  
  aes(x = x, y = y) +  
  geom_point(alpha = 0.05,  
             color = "darkred",  
             size = 0)
```



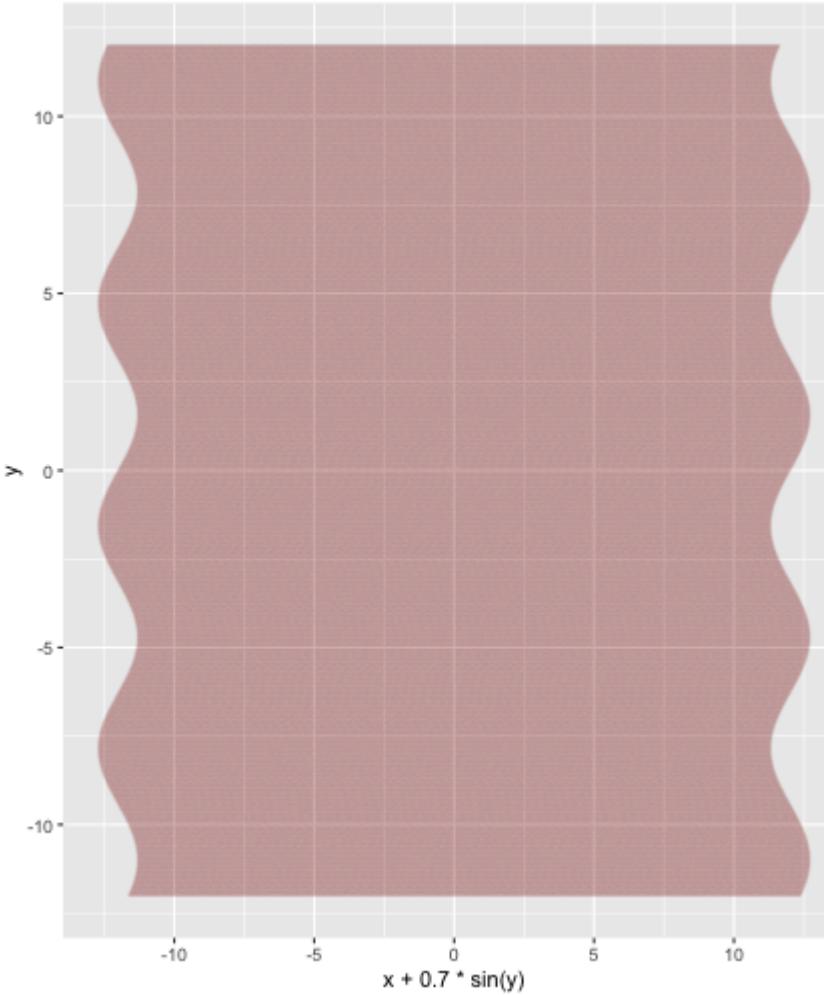
```
seq(-12,12, by = 0.04) ->  
  my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot() +  
  aes(x = x, y = y) +  
  geom_point(alpha = 0.05,  
             color = "darkred",  
             size = 0) +  
  aes(x = x + .1 * sin(y))
```



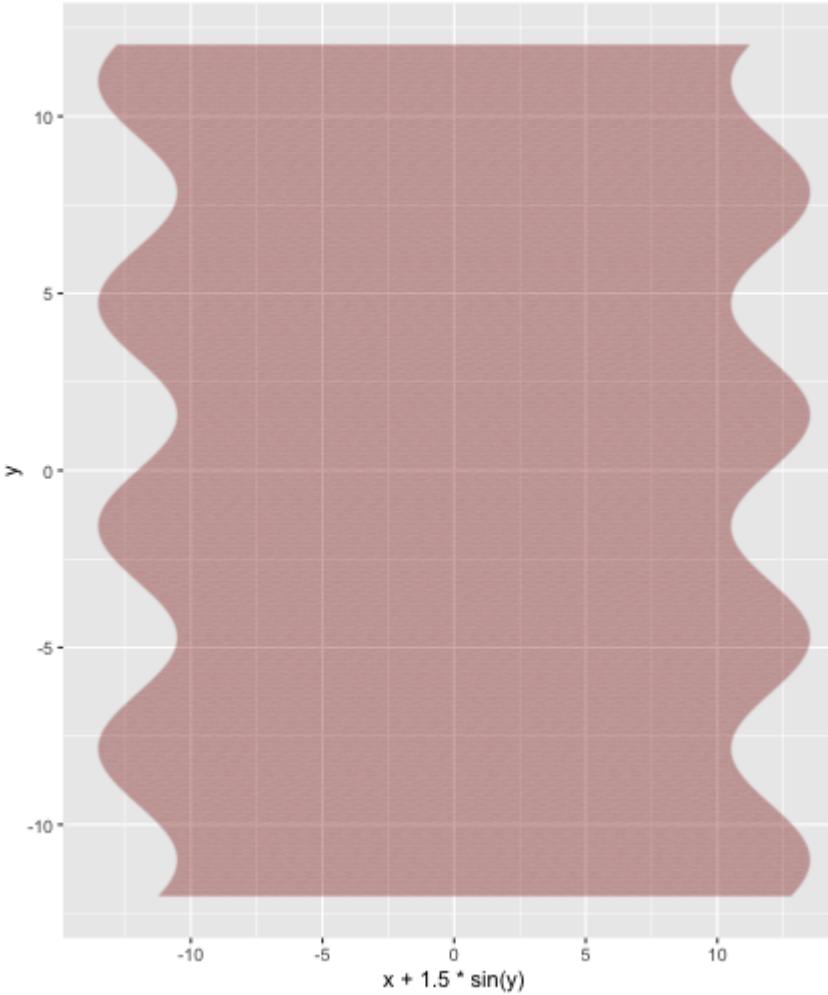
```
seq(-12,12, by = 0.04) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x, y = y) +  
geom_point(alpha = 0.05,  
color = "darkred",  
size = 0) +  
aes(x = x + .1 * sin(y)) +  
aes(x = x + .3 * sin(y))
```



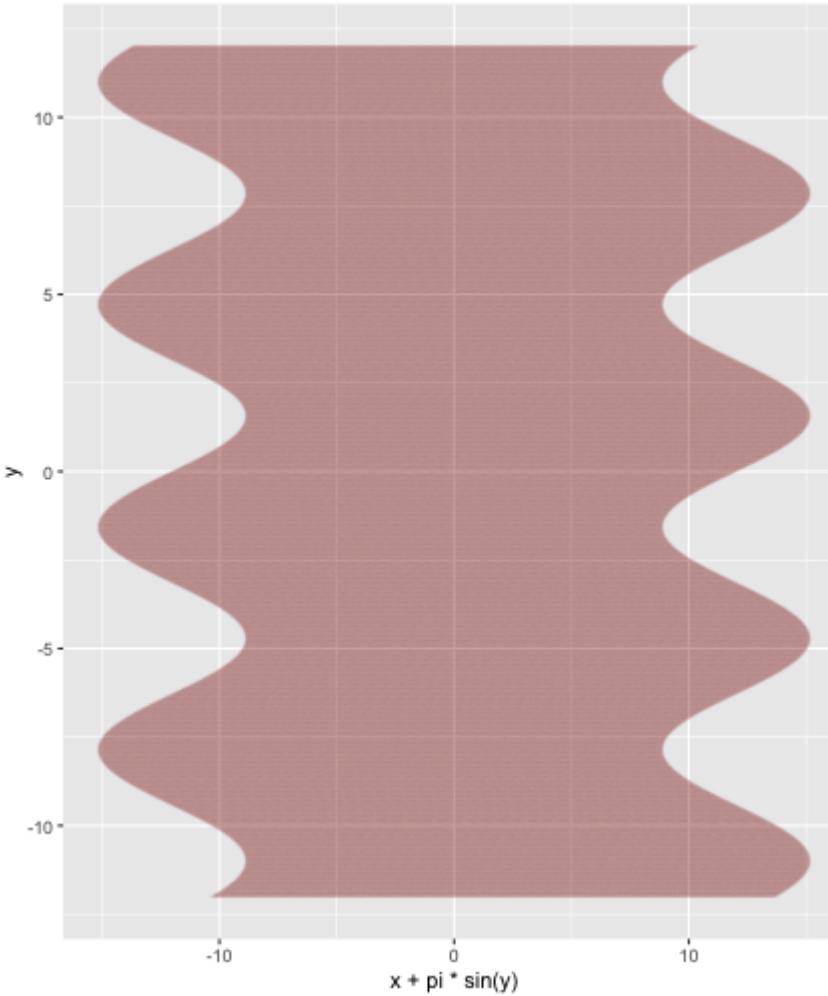
```
seq(-12,12, by = 0.04) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x, y = y) +  
geom_point(alpha = 0.05,  
color = "darkred",  
size = 0) +  
aes(x = x + .1 * sin(y)) +  
aes(x = x + .3 * sin(y)) +  
aes(x = x + .7 * sin(y))
```



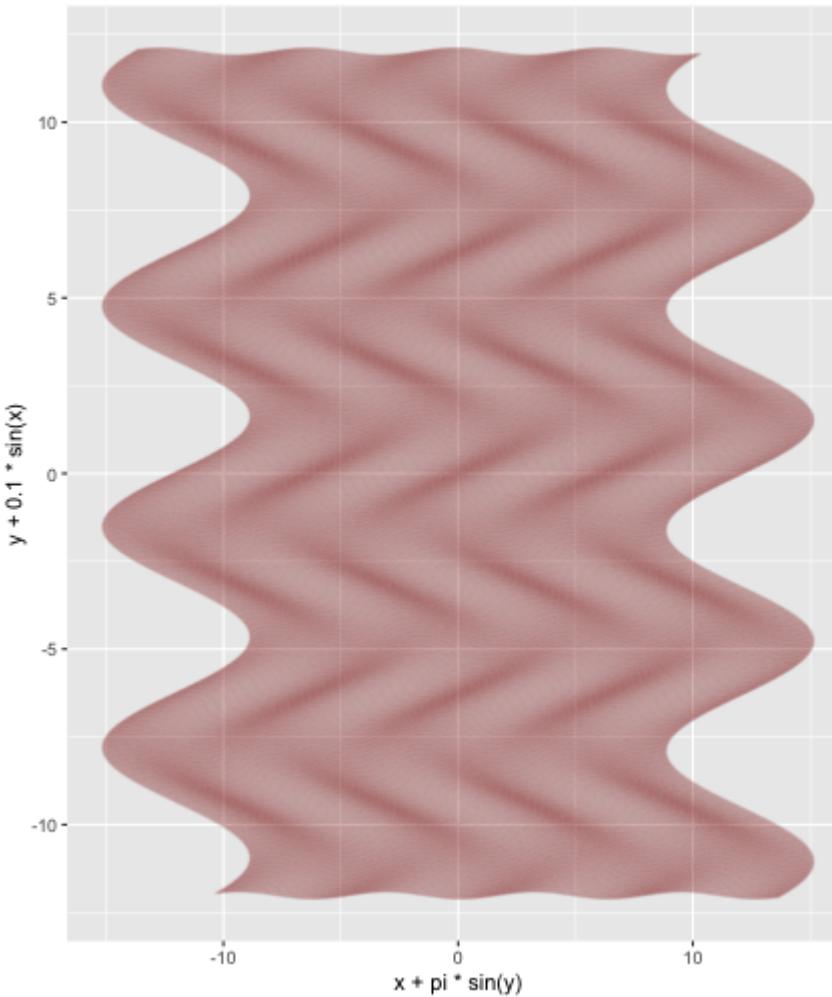
```
seq(-12,12, by = 0.04) ->  
  my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot() +  
  aes(x = x, y = y) +  
  geom_point(alpha = 0.05,  
             color = "darkred",  
             size = 0) +  
  aes(x = x + .1 * sin(y)) +  
  aes(x = x + .3 * sin(y)) +  
  aes(x = x + .7 * sin(y)) +  
  aes(x = x + 1.5 * sin(y))
```



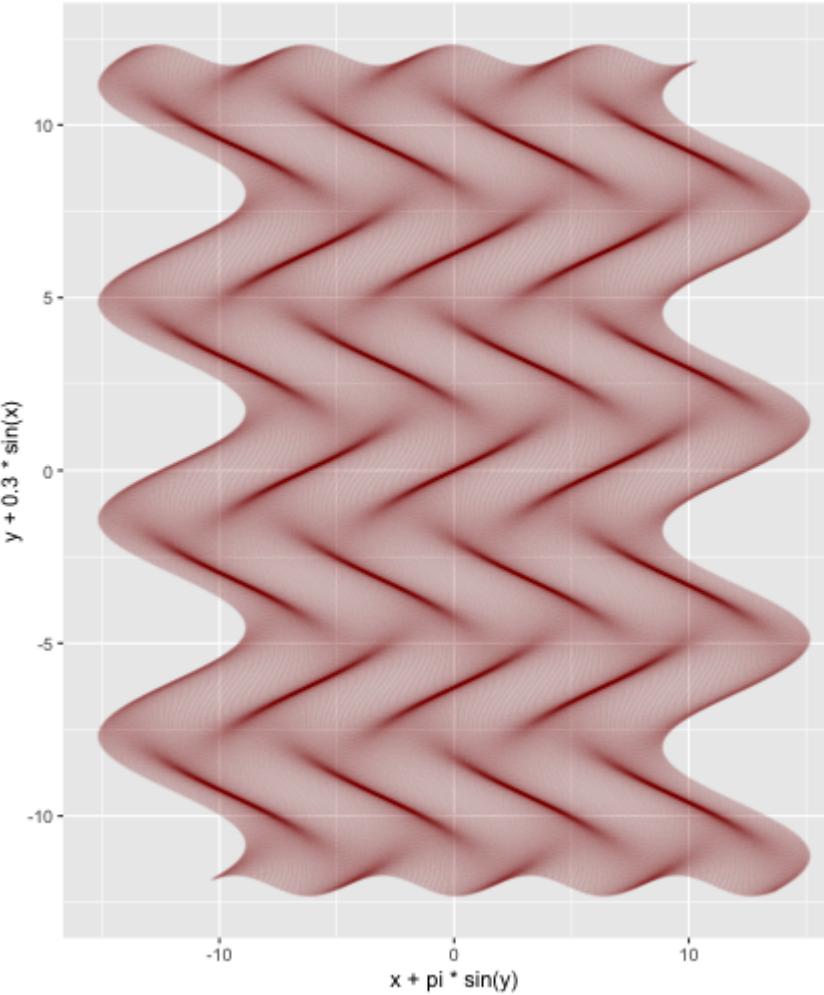
```
seq(-12,12, by = 0.04) ->  
  my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot() +  
  aes(x = x, y = y) +  
  geom_point(alpha = 0.05,  
             color = "darkred",  
             size = 0) +  
  aes(x = x + .1 * sin(y)) +  
  aes(x = x + .3 * sin(y)) +  
  aes(x = x + .7 * sin(y)) +  
  aes(x = x + 1.5 * sin(y)) +  
  aes(x = x + pi * sin(y))
```



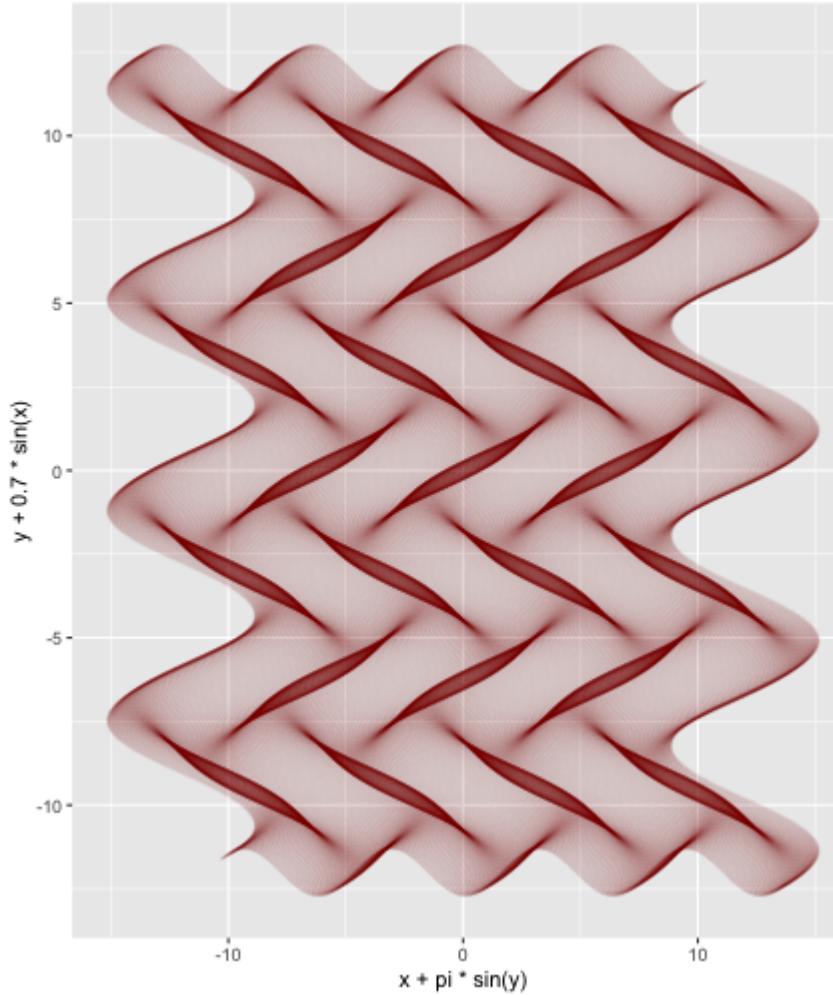
```
seq(-12,12, by = 0.04) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x, y = y) +  
geom_point(alpha = 0.05,  
           color = "darkred",  
           size = 0) +  
aes(x = x + .1 * sin(y)) +  
aes(x = x + .3 * sin(y)) +  
aes(x = x + .7 * sin(y)) +  
aes(x = x + 1.5 * sin(y)) +  
aes(x = x + pi * sin(y)) +  
aes(y = y + .1 * sin(x))
```



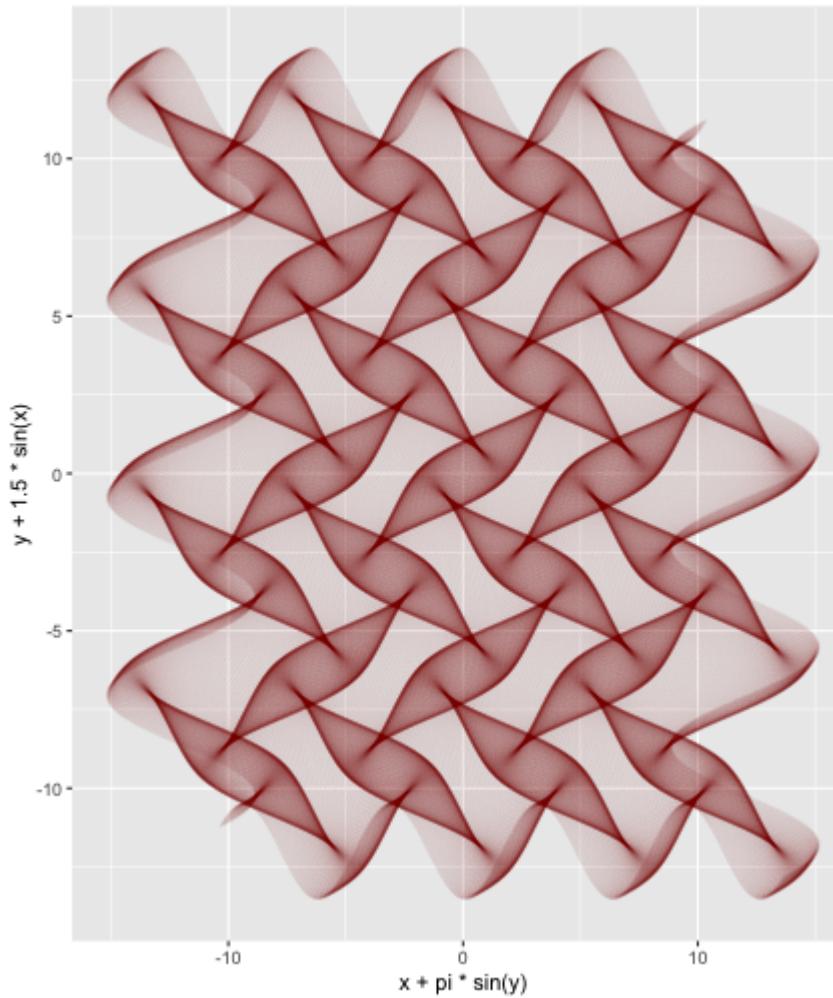
```
seq(-12,12, by = 0.04) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x, y = y) +  
geom_point(alpha = 0.05,  
           color = "darkred",  
           size = 0) +  
aes(x = x + .1 * sin(y)) +  
aes(x = x + .3 * sin(y)) +  
aes(x = x + .7 * sin(y)) +  
aes(x = x + 1.5 * sin(y)) +  
aes(x = x + pi * sin(y)) +  
aes(y = y + .1 * sin(x)) +  
aes(y = y + .3 * sin(x))
```



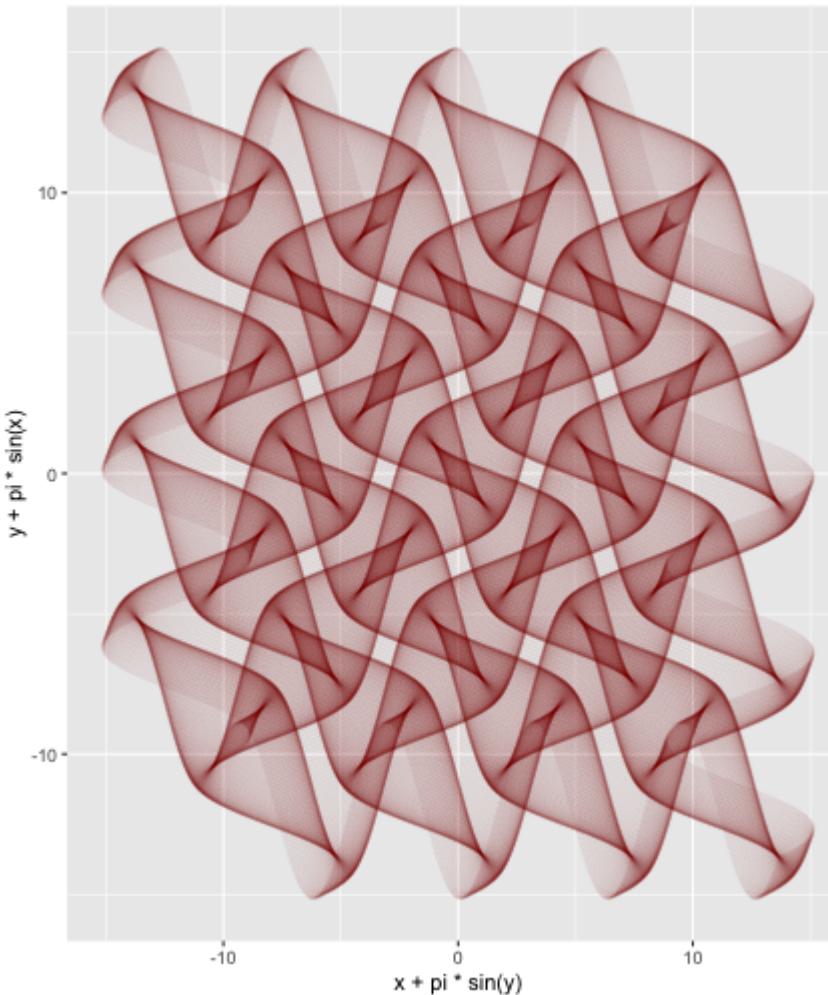
```
seq(-12,12, by = 0.04) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x, y = y) +  
geom_point(alpha = 0.05,  
           color = "darkred",  
           size = 0) +  
aes(x = x + .1 * sin(y)) +  
aes(x = x + .3 * sin(y)) +  
aes(x = x + .7 * sin(y)) +  
aes(x = x + 1.5 * sin(y)) +  
aes(x = x + pi * sin(y)) +  
aes(y = y + .1 * sin(x)) +  
aes(y = y + .3 * sin(x)) +  
aes(y = y + .7 * sin(x))
```



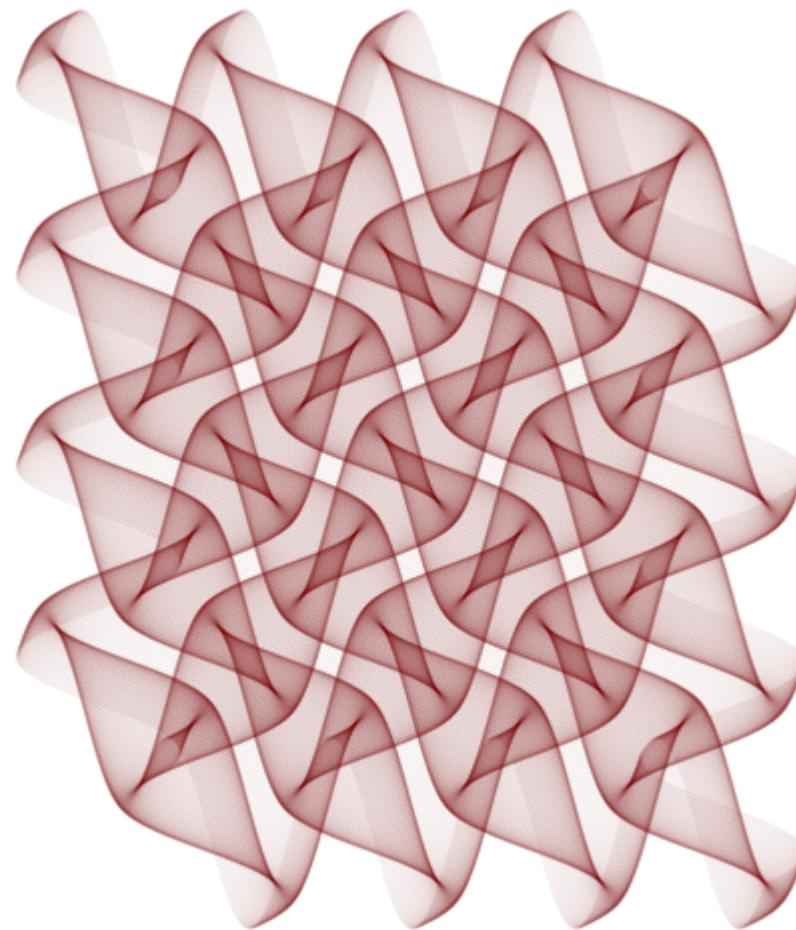
```
seq(-12,12, by = 0.04) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x, y = y) +  
geom_point(alpha = 0.05,  
           color = "darkred",  
           size = 0) +  
aes(x = x + .1 * sin(y)) +  
aes(x = x + .3 * sin(y)) +  
aes(x = x + .7 * sin(y)) +  
aes(x = x + 1.5 * sin(y)) +  
aes(x = x + pi * sin(y)) +  
aes(y = y + .1 * sin(x)) +  
aes(y = y + .3 * sin(x)) +  
aes(y = y + .7 * sin(x)) +  
aes(y = y + 1.5 * sin(x))
```



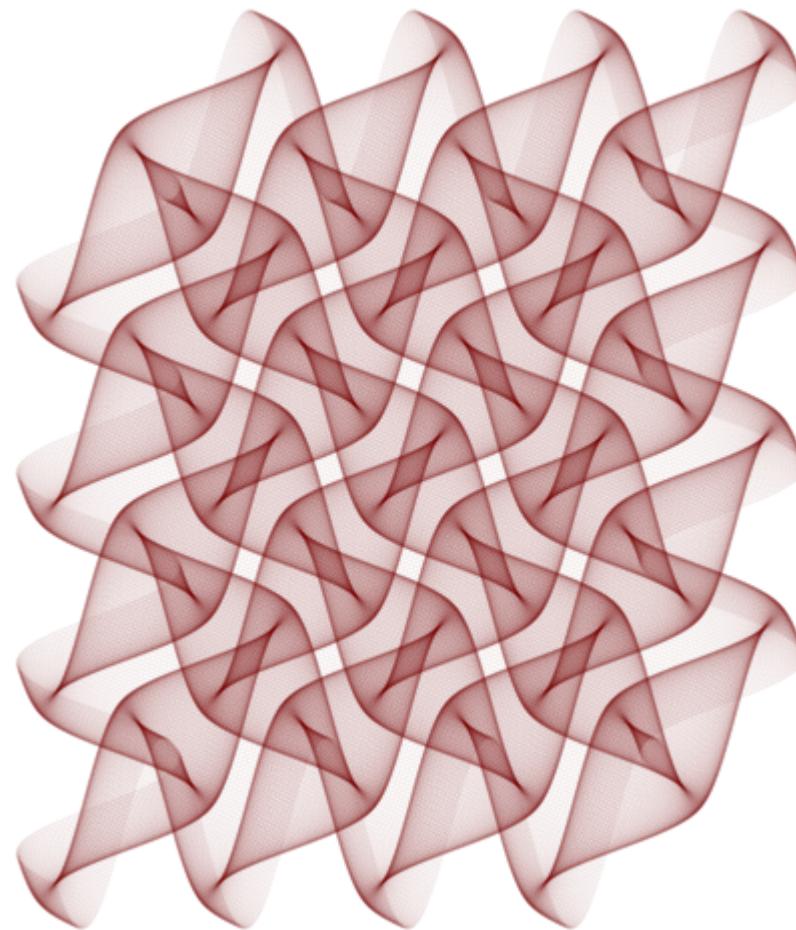
```
seq(-12,12, by = 0.04) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x, y = y) +  
geom_point(alpha = 0.05,  
           color = "darkred",  
           size = 0) +  
aes(x = x + .1 * sin(y)) +  
aes(x = x + .3 * sin(y)) +  
aes(x = x + .7 * sin(y)) +  
aes(x = x + 1.5 * sin(y)) +  
aes(x = x + pi * sin(y)) +  
aes(y = y + .1 * sin(x)) +  
aes(y = y + .3 * sin(x)) +  
aes(y = y + .7 * sin(x)) +  
aes(y = y + 1.5 * sin(x)) +  
aes(y = y + pi * sin(x))
```



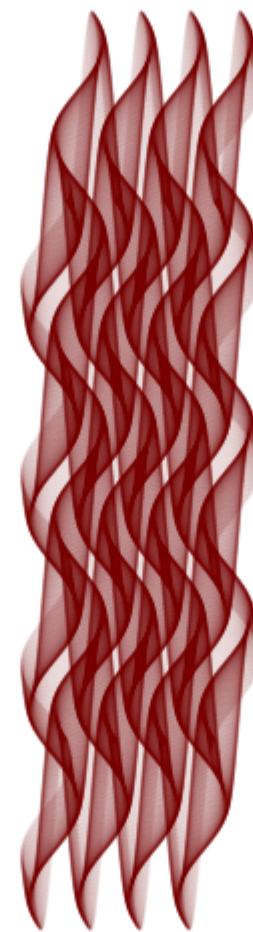
```
seq(-12,12, by = 0.04) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x, y = y) +  
geom_point(alpha = 0.05,  
           color = "darkred",  
           size = 0) +  
aes(x = x + .1 * sin(y)) +  
aes(x = x + .3 * sin(y)) +  
aes(x = x + .7 * sin(y)) +  
aes(x = x + 1.5 * sin(y)) +  
aes(x = x + pi * sin(y)) +  
aes(y = y + .1 * sin(x)) +  
aes(y = y + .3 * sin(x)) +  
aes(y = y + .7 * sin(x)) +  
aes(y = y + 1.5 * sin(x)) +  
aes(y = y + pi * sin(x)) +  
theme_void()
```



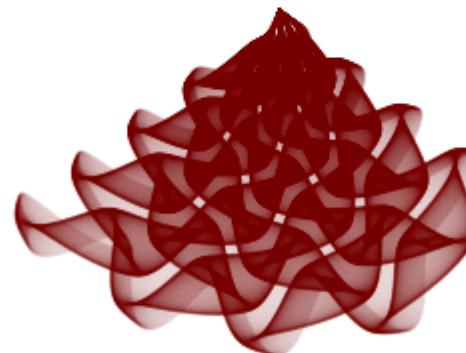
```
seq(-12,12, by = 0.04) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x, y = y) +  
geom_point(alpha = 0.05,  
           color = "darkred",  
           size = 0) +  
aes(x = x + .1 * sin(y)) +  
aes(x = x + .3 * sin(y)) +  
aes(x = x + .7 * sin(y)) +  
aes(x = x + 1.5 * sin(y)) +  
aes(x = x + pi * sin(y)) +  
aes(y = y + .1 * sin(x)) +  
aes(y = y + .3 * sin(x)) +  
aes(y = y + .7 * sin(x)) +  
aes(y = y + 1.5 * sin(x)) +  
aes(y = y + pi * sin(x)) +  
theme_void() +  
scale_y_reverse()
```



```
seq(-12,12, by = 0.04) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x, y = y) +  
geom_point(alpha = 0.05,  
           color = "darkred",  
           size = 0) +  
aes(x = x + .1 * sin(y)) +  
aes(x = x + .3 * sin(y)) +  
aes(x = x + .7 * sin(y)) +  
aes(x = x + 1.5 * sin(y)) +  
aes(x = x + pi * sin(y)) +  
aes(y = y + .1 * sin(x)) +  
aes(y = y + .3 * sin(x)) +  
aes(y = y + .7 * sin(x)) +  
aes(y = y + 1.5 * sin(x)) +  
aes(y = y + pi * sin(x)) +  
theme_void() +  
scale_y_reverse() +  
scale_x_continuous(limits = c(-50, 50))
```

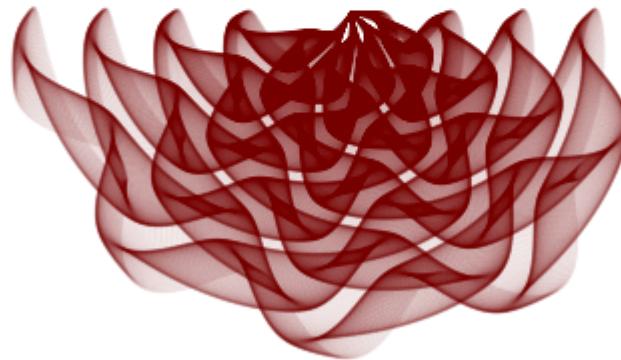


```
seq(-12,12, by = 0.04) ->  
my_seq  
  
tibble(x = my_seq) %>%  
crossing(y = my_seq) %>%  
ggplot() +  
aes(x = x, y = y) +  
geom_point(alpha = 0.05,  
           color = "darkred",  
           size = 0) +  
aes(x = x + .1 * sin(y)) +  
aes(x = x + .3 * sin(y)) +  
aes(x = x + .7 * sin(y)) +  
aes(x = x + 1.5 * sin(y)) +  
aes(x = x + pi * sin(y)) +  
aes(y = y + .1 * sin(x)) +  
aes(y = y + .3 * sin(x)) +  
aes(y = y + .7 * sin(x)) +  
aes(y = y + 1.5 * sin(x)) +  
aes(y = y + pi * sin(x)) +  
theme_void() +  
scale_y_reverse() +  
scale_x_continuous(limits = c(-50, 50)) +  
coord_polar()
```



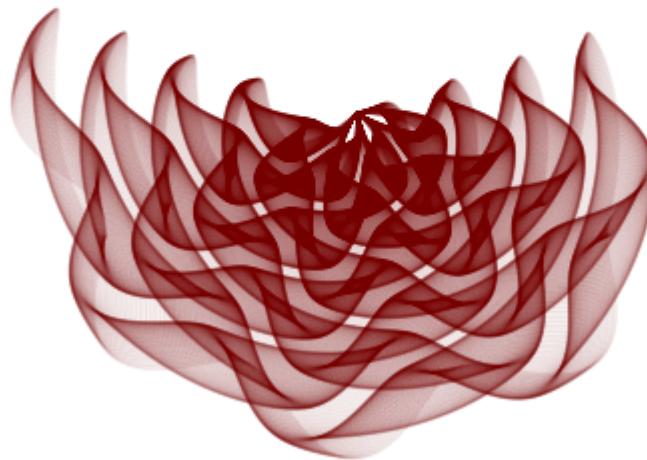
```
seq(-12,12, by = 0.04) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x, y = y) +
  geom_point(alpha = 0.05,
             color = "darkred",
             size = 0) +
  aes(x = x + .1 * sin(y)) +
  aes(x = x + .3 * sin(y)) +
  aes(x = x + .7 * sin(y)) +
  aes(x = x + 1.5 * sin(y)) +
  aes(x = x + pi * sin(y)) +
  aes(y = y + .1 * sin(x)) +
  aes(y = y + .3 * sin(x)) +
  aes(y = y + .7 * sin(x)) +
  aes(y = y + 1.5 * sin(x)) +
  aes(y = y + pi * sin(x)) +
  theme_void() +
  scale_y_reverse() +
  scale_x_continuous(limits = c(-50, 50)) +
  coord_polar() +
  scale_x_continuous(limits = c(-30, 30))
```



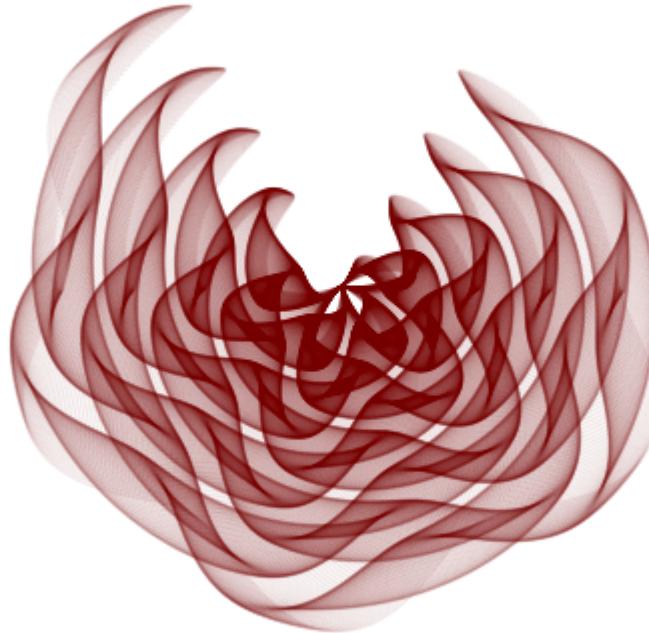
```
seq(-12,12, by = 0.04) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x, y = y) +
  geom_point(alpha = 0.05,
             color = "darkred",
             size = 0) +
  aes(x = x + .1 * sin(y)) +
  aes(x = x + .3 * sin(y)) +
  aes(x = x + .7 * sin(y)) +
  aes(x = x + 1.5 * sin(y)) +
  aes(x = x + pi * sin(y)) +
  aes(y = y + .1 * sin(x)) +
  aes(y = y + .3 * sin(x)) +
  aes(y = y + .7 * sin(x)) +
  aes(y = y + 1.5 * sin(x)) +
  aes(y = y + pi * sin(x)) +
  theme_void() +
  scale_y_reverse() +
  scale_x_continuous(limits = c(-50, 50)) +
  coord_polar() +
  scale_x_continuous(limits = c(-30, 30)) +
  scale_x_continuous(limits = c(-25, 25))
```



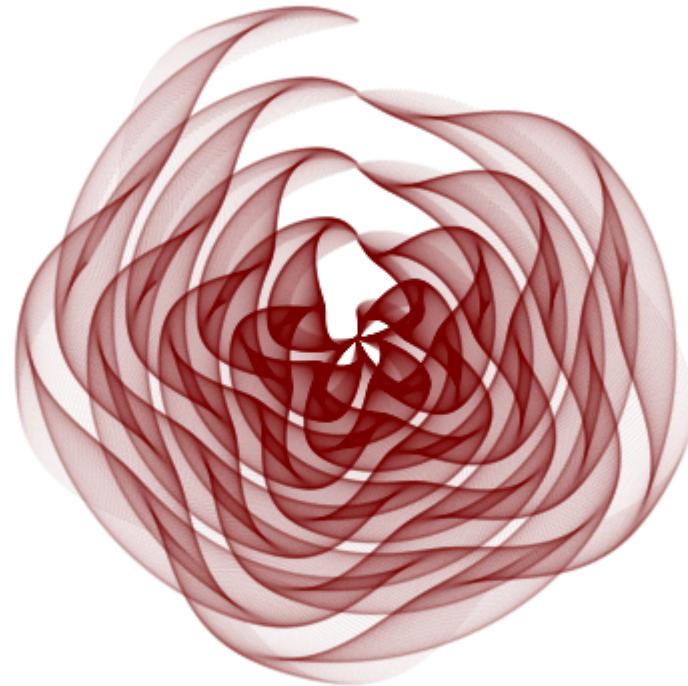
```
seq(-12,12, by = 0.04) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x, y = y) +
  geom_point(alpha = 0.05,
             color = "darkred",
             size = 0) +
  aes(x = x + .1 * sin(y)) +
  aes(x = x + .3 * sin(y)) +
  aes(x = x + .7 * sin(y)) +
  aes(x = x + 1.5 * sin(y)) +
  aes(x = x + pi * sin(y)) +
  aes(y = y + .1 * sin(x)) +
  aes(y = y + .3 * sin(x)) +
  aes(y = y + .7 * sin(x)) +
  aes(y = y + 1.5 * sin(x)) +
  aes(y = y + pi * sin(x)) +
  theme_void() +
  scale_y_reverse() +
  scale_x_continuous(limits = c(-50, 50)) +
  coord_polar() +
  scale_x_continuous(limits = c(-30, 30)) +
  scale_x_continuous(limits = c(-25, 25)) +
  scale_x_continuous(limits = c(-18, 18))
```



```
seq(-12,12, by = 0.04) ->
  my_seq

tibble(x = my_seq) %>%
  crossing(y = my_seq) %>%
  ggplot() +
  aes(x = x, y = y) +
  geom_point(alpha = 0.05,
             color = "darkred",
             size = 0) +
  aes(x = x + .1 * sin(y)) +
  aes(x = x + .3 * sin(y)) +
  aes(x = x + .7 * sin(y)) +
  aes(x = x + 1.5 * sin(y)) +
  aes(x = x + pi * sin(y)) +
  aes(y = y + .1 * sin(x)) +
  aes(y = y + .3 * sin(x)) +
  aes(y = y + .7 * sin(x)) +
  aes(y = y + 1.5 * sin(x)) +
  aes(y = y + pi * sin(x)) +
  theme_void() +
  scale_y_reverse() +
  scale_x_continuous(limits = c(-50, 50)) +
  coord_polar() +
  scale_x_continuous(limits = c(-30, 30)) +
  scale_x_continuous(limits = c(-25, 25)) +
  scale_x_continuous(limits = c(-18, 18)) +
  scale_x_continuous()
```



Dandalion: One less deconstructed

```
seq(-2,2, by = 0.01)
```

```
[1] -2.00 -1.99 -1.98 -1.97 -1.96 -1.95 -1.94 -1.93 -1.92 -1.91 -1.90 -1.89  
[13] -1.88 -1.87 -1.86 -1.85 -1.84 -1.83 -1.82 -1.81 -1.80 -1.79 -1.78 -1.77  
[25] -1.76 -1.75 -1.74 -1.73 -1.72 -1.71 -1.70 -1.69 -1.68 -1.67 -1.66 -1.65  
[37] -1.64 -1.63 -1.62 -1.61 -1.60 -1.59 -1.58 -1.57 -1.56 -1.55 -1.54 -1.53  
[49] -1.52 -1.51 -1.50 -1.49 -1.48 -1.47 -1.46 -1.45 -1.44 -1.43 -1.42 -1.41  
[61] -1.40 -1.39 -1.38 -1.37 -1.36 -1.35 -1.34 -1.33 -1.32 -1.31 -1.30 -1.29  
[73] -1.28 -1.27 -1.26 -1.25 -1.24 -1.23 -1.22 -1.21 -1.20 -1.19 -1.18 -1.17  
[85] -1.16 -1.15 -1.14 -1.13 -1.12 -1.11 -1.10 -1.09 -1.08 -1.07 -1.06 -1.05  
[97] -1.04 -1.03 -1.02 -1.01 -1.00 -0.99 -0.98 -0.97 -0.96 -0.95 -0.94 -0.93  
[109] -0.92 -0.91 -0.90 -0.89 -0.88 -0.87 -0.86 -0.85 -0.84 -0.83 -0.82 -0.81  
[121] -0.80 -0.79 -0.78 -0.77 -0.76 -0.75 -0.74 -0.73 -0.72 -0.71 -0.70 -0.69  
[133] -0.68 -0.67 -0.66 -0.65 -0.64 -0.63 -0.62 -0.61 -0.60 -0.59 -0.58 -0.57  
[145] -0.56 -0.55 -0.54 -0.53 -0.52 -0.51 -0.50 -0.49 -0.48 -0.47 -0.46 -0.45  
[157] -0.44 -0.43 -0.42 -0.41 -0.40 -0.39 -0.38 -0.37 -0.36 -0.35 -0.34 -0.33  
[169] -0.32 -0.31 -0.30 -0.29 -0.28 -0.27 -0.26 -0.25 -0.24 -0.23 -0.22 -0.21  
[181] -0.20 -0.19 -0.18 -0.17 -0.16 -0.15 -0.14 -0.13 -0.12 -0.11 -0.10 -0.09  
[193] -0.08 -0.07 -0.06 -0.05 -0.04 -0.03 -0.02 -0.01 0.00 0.01 0.02 0.03  
[205] 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15  
[217] 0.16 0.17 0.18 0.19 0.20 0.21 0.22 0.23 0.24 0.25 0.26 0.27  
[229] 0.28 0.29 0.30 0.31 0.32 0.33 0.34 0.35 0.36 0.37 0.38 0.39  
[241] 0.40 0.41 0.42 0.43 0.44 0.45 0.46 0.47 0.48 0.49 0.50 0.51  
[253] 0.52 0.53 0.54 0.55 0.56 0.57 0.58 0.59 0.60 0.61 0.62 0.63  
[265] 0.64 0.65 0.66 0.67 0.68 0.69 0.70 0.71 0.72 0.73 0.74 0.75  
[277] 0.76 0.77 0.78 0.79 0.80 0.81 0.82 0.83 0.84 0.85 0.86 0.87  
[289] 0.88 0.89 0.90 0.91 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99  
[301] 1.00 1.01 1.02 1.03 1.04 1.05 1.06 1.07 1.08 1.09 1.10 1.11  
[313] 1.12 1.13 1.14 1.15 1.16 1.17 1.18 1.19 1.20 1.21 1.22 1.23  
[325] 1.24 1.25 1.26 1.27 1.28 1.29 1.30 1.31 1.32 1.33 1.34 1.35  
[337] 1.36 1.37 1.38 1.39 1.40 1.41 1.42 1.43 1.44 1.45 1.46 1.47  
[349] 1.48 1.49 1.50 1.51 1.52 1.53 1.54 1.55 1.56 1.57 1.58 1.59 125/12
```

Dandalion: One less deconstructed

```
seq(-2, 2, by = 0.01) ->  
my_seq
```

Dandalion: One less deconstructed

```
seq(-2, 2, by = 0.01) ->
  my_seq
tibble(x = my_seq)
```

```
# A tibble: 401 x 1
#>   x
#>   <dbl>
#> 1 -2
#> 2 -1.99
#> 3 -1.98
#> 4 -1.97
#> 5 -1.96
#> 6 -1.95
#> 7 -1.94
#> 8 -1.93
#> 9 -1.92
#> 10 -1.91
# ... with 391 more rows
```

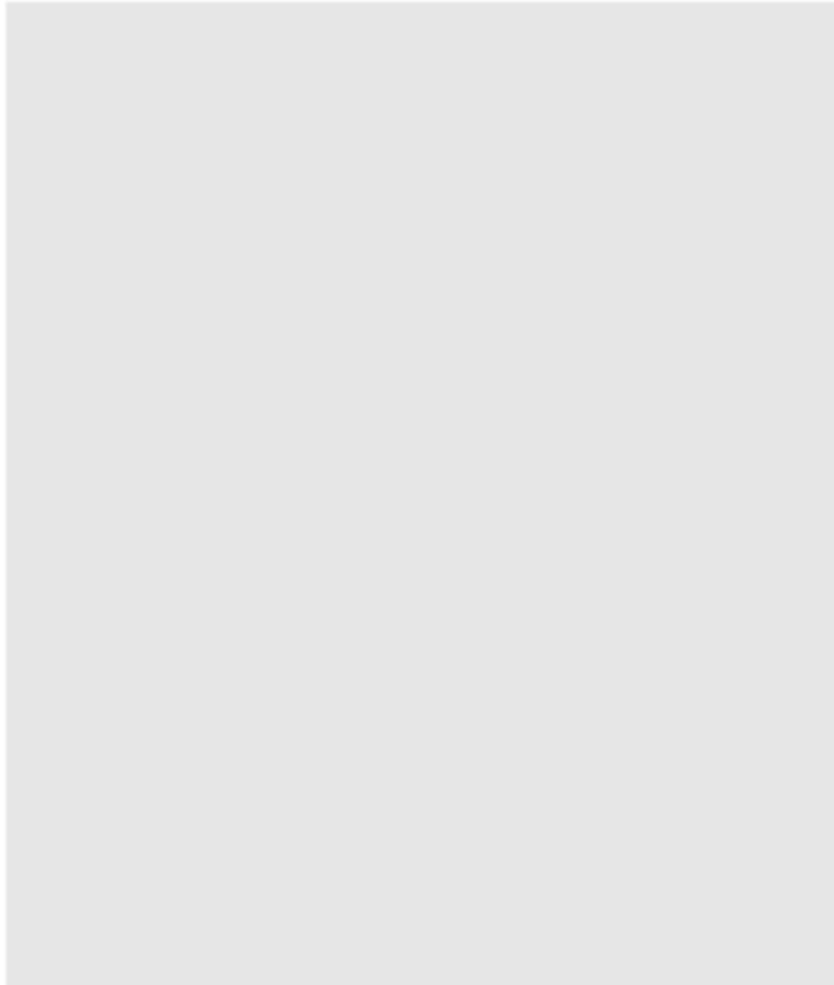
Dandalion: One less deconstructed

```
seq(-2, 2, by = 0.01) ->  
  my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq)
```

```
# A tibble: 160,801 x 2  
      x     y  
  <dbl> <dbl>  
1    -2    -2  
2    -2   -1.99  
3    -2   -1.98  
4    -2   -1.97  
5    -2   -1.96  
6    -2   -1.95  
7    -2   -1.94  
8    -2   -1.93  
9    -2   -1.92  
10   -2   -1.91  
# ... with 160,791 more rows
```

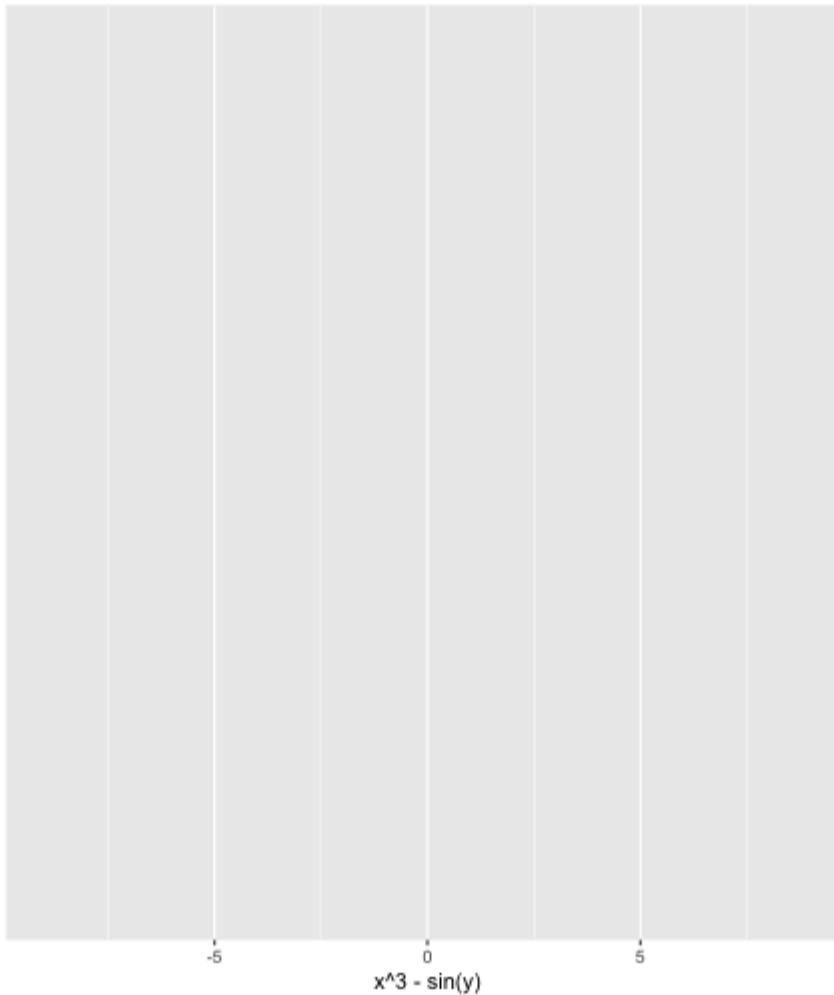
Dandalion: One less deconstructed

```
seq(-2, 2, by = 0.01) ->  
  my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot()
```



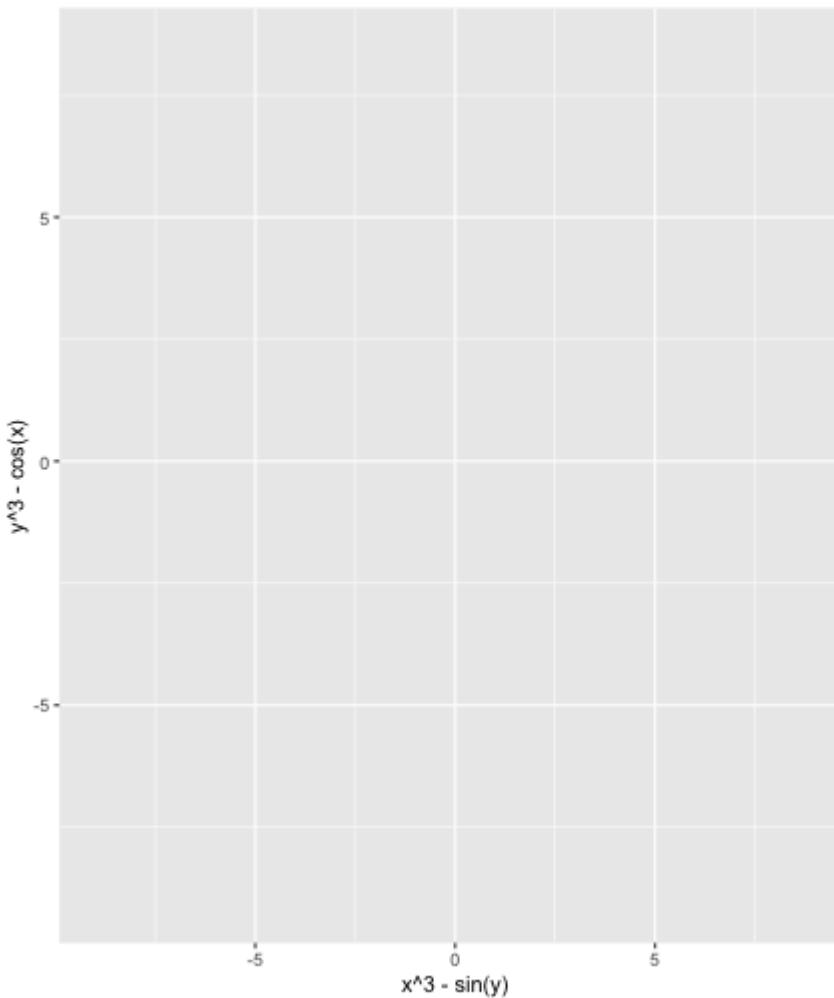
Dandalion: One less deconstructed

```
seq(-2, 2, by = 0.01) ->  
  my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot() +  
    aes(x = x^3 - sin(y))
```



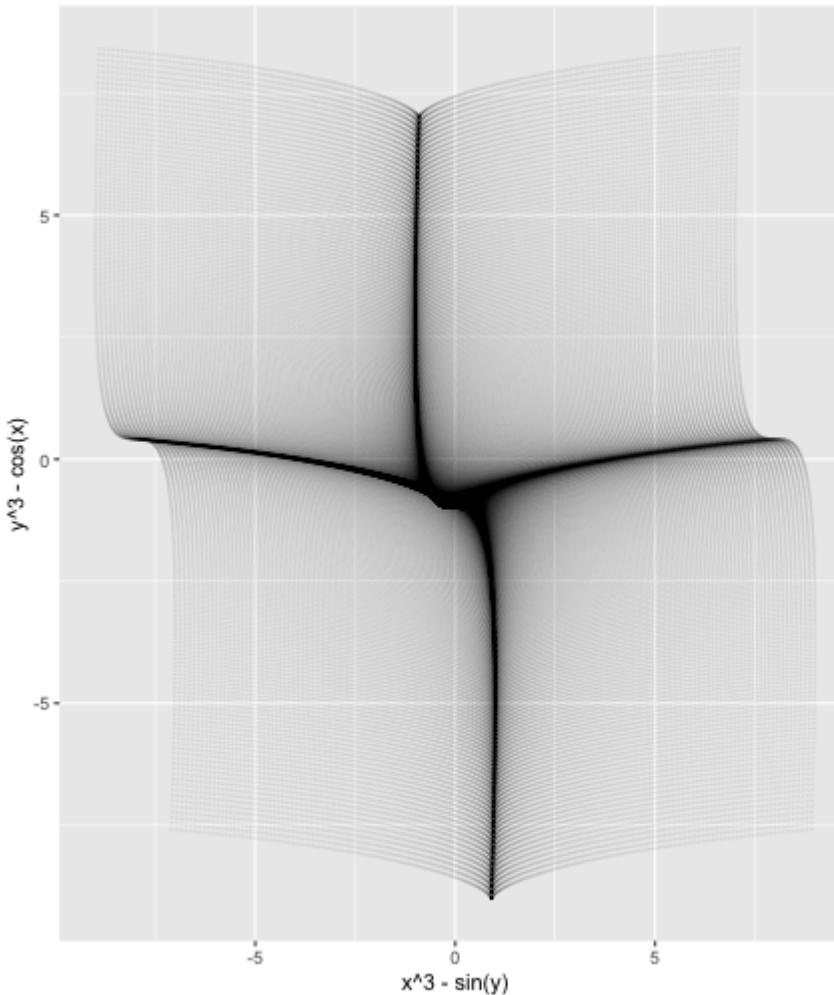
Dandalion: One less deconstructed

```
seq(-2, 2, by = 0.01) ->  
  my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot() +  
  aes(x = x^3 - sin(y)) +  
  aes(y = y^3 - cos(x))
```



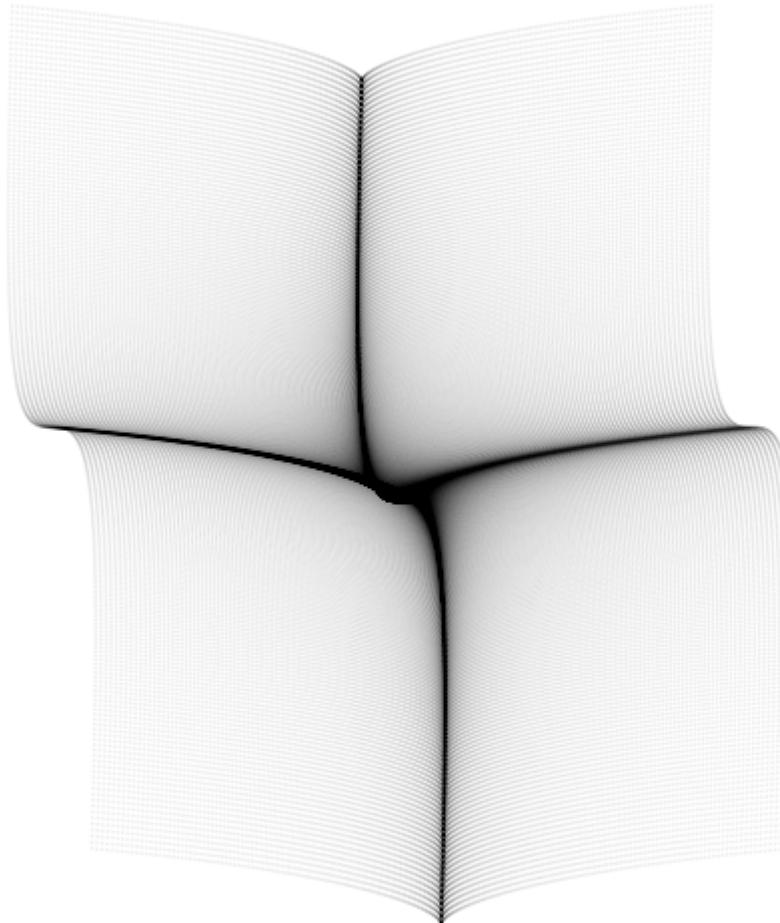
Dandalion: One less deconstructed

```
seq(-2, 2, by = 0.01) ->  
  my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot() +  
  aes(x = x^3 - sin(y)) +  
  aes(y = y^3 - cos(x)) +  
  geom_point(alpha = 0.05,  
             size = 0)
```



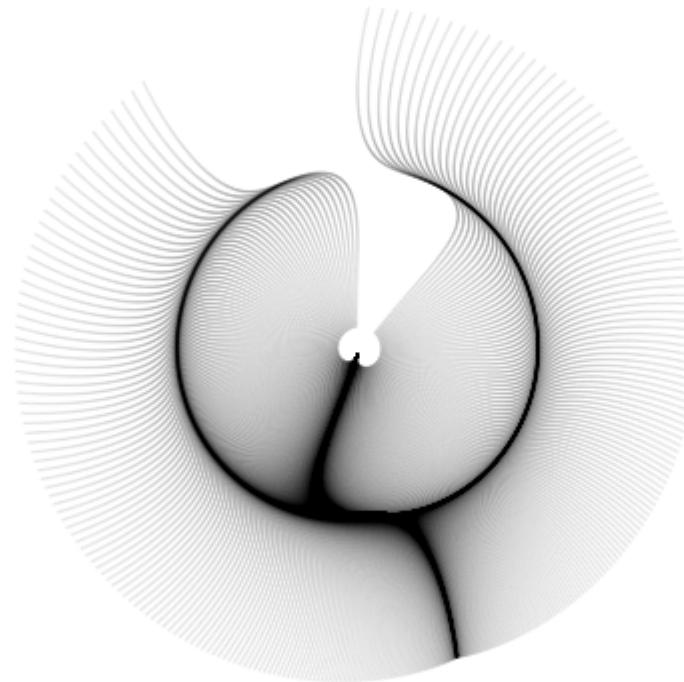
Dandalion: One less deconstructed

```
seq(-2, 2, by = 0.01) ->  
  my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot() +  
  aes(x = x^3 - sin(y)) +  
  aes(y = y^3 - cos(x)) +  
  geom_point(alpha = 0.05,  
             size = 0) +  
  theme_void()
```



Dandalion: One less deconstructed

```
seq(-2,2, by = 0.01) ->  
  my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot() +  
  aes(x = x^3 - sin(y)) +  
  aes(y = y^3 - cos(x)) +  
  geom_point(alpha = 0.05,  
             size = 0) +  
  theme_void() +  
  coord_polar()
```



Dandalion: One less deconstructed

```
seq(-2,2, by = 0.01) ->  
my_seq  
  
tibble(x = my_seq) %>%  
  crossing(y = my_seq) %>%  
  ggplot() +  
  aes(x = x^3 - sin(y)) +  
  aes(y = y^3 - cos(x)) +  
  geom_point(alpha = 0.05,  
             size = 0) +  
  theme_void() +  
  coord_polar() +  
  labs(subtitle = "Dandelion")
```

Dandelion

