r4ds Ex 7.3.4

MW

2019/06/12

7.3.4

1

> Explore the distribution of each of the `x`, `y`, and `z` variables in `diamonds`. What do you learn? Think about a diamond and how you might decide which dimension is the length, width, and depth.

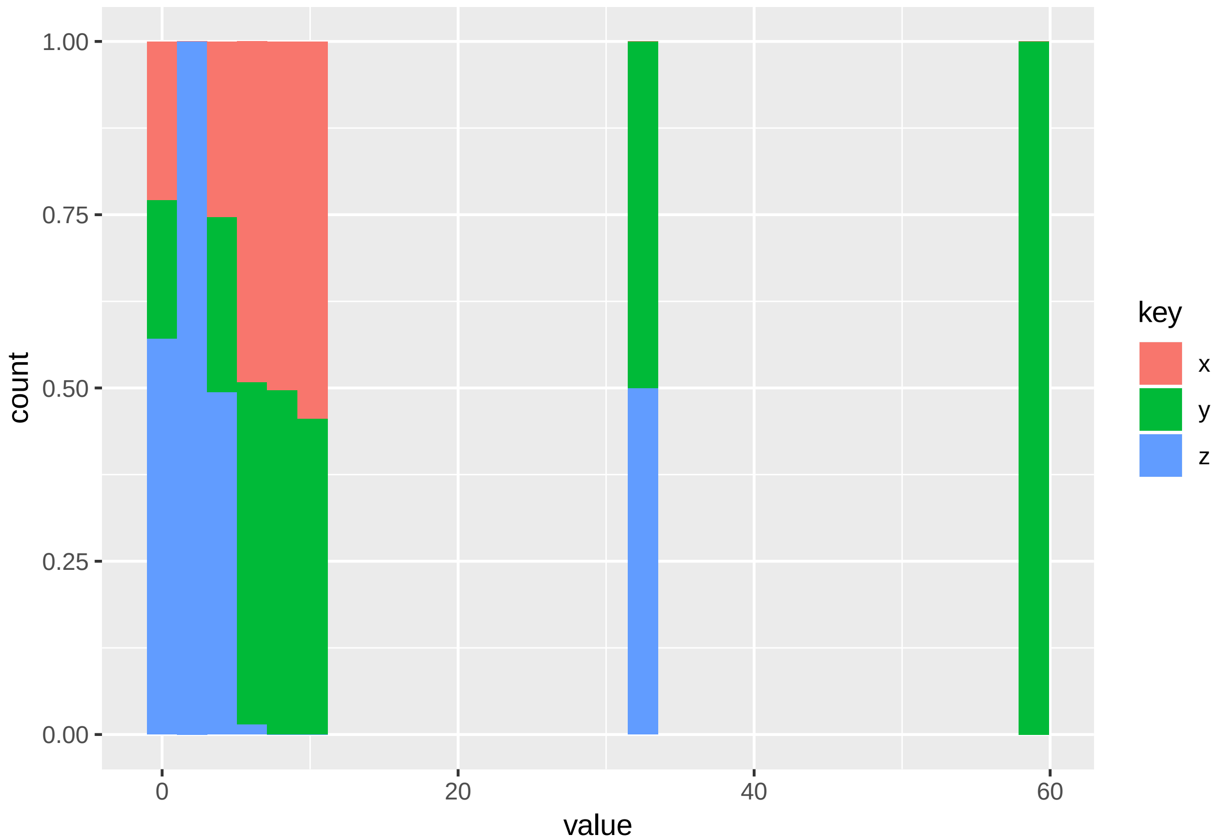
```
diamonds %>% select(x,y,z) %>% summary
```

```
##        x                y                z         
##  Min.   : 0.000   Min.   : 0.000   Min.   : 0.000  
##  1st Qu.: 4.710   1st Qu.: 4.720   1st Qu.: 2.910  
##  Median : 5.700   Median : 5.710   Median : 3.530  
##  Mean   : 5.731   Mean   : 5.735   Mean   : 3.539  
##  3rd Qu.: 6.540   3rd Qu.: 6.540   3rd Qu.: 4.040  
##  Max.   :10.740   Max.   :58.900   Max.   :31.800  
```

```
diamonds %>% select(x,y,z) %>%
    gather() %>%
    ggplot(aes(x=value, fill = key)) +
    geom_histogram(position = "fill")
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```

```
## Warning: Removed 66 rows containing missing values (geom_bar).
```



2

Explore the distribution of price. Do you discover anything unusual or surprising? (Hint: Carefully think about the `binwidth` and make sure you try a wide range of values.)

3

How many diamonds are 0.99 carat? How many are 1 carat? What do you think is the cause of the difference?

```
diamonds %>% filter(carat >= 0.99, carat <= 1) %>%
    count(carat)
```

```
## # A tibble: 2 x 2
##   carat     n
##   <dbl> <int>
## 1  0.99    23
## 2  1     1558
```

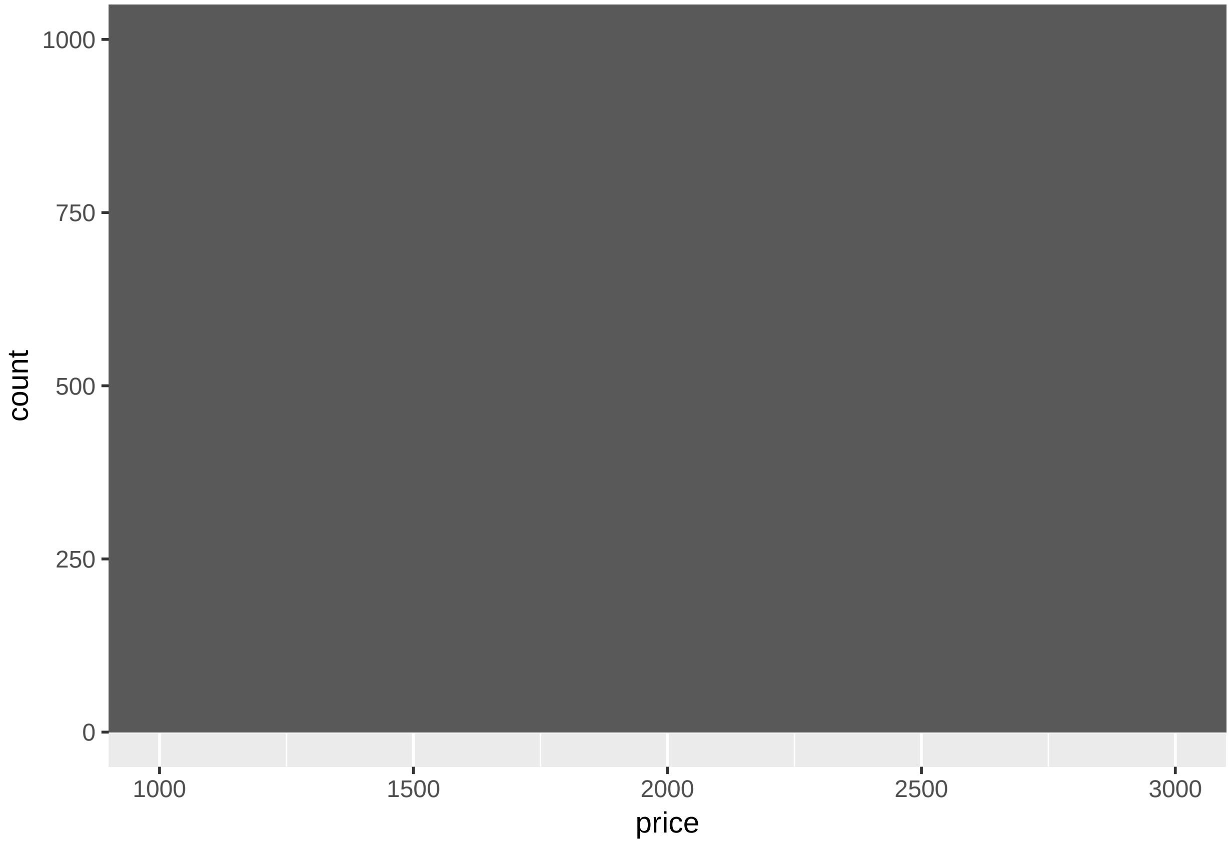
These results inply that many diamonds are rounded up.

4

Compare and contrast `coord_cartesian()` vs `xlim()` or `ylim()` when zooming in on a histogram. What happens if you leave binwidth unset? What happens if you try and zoom so only half a bar shows?

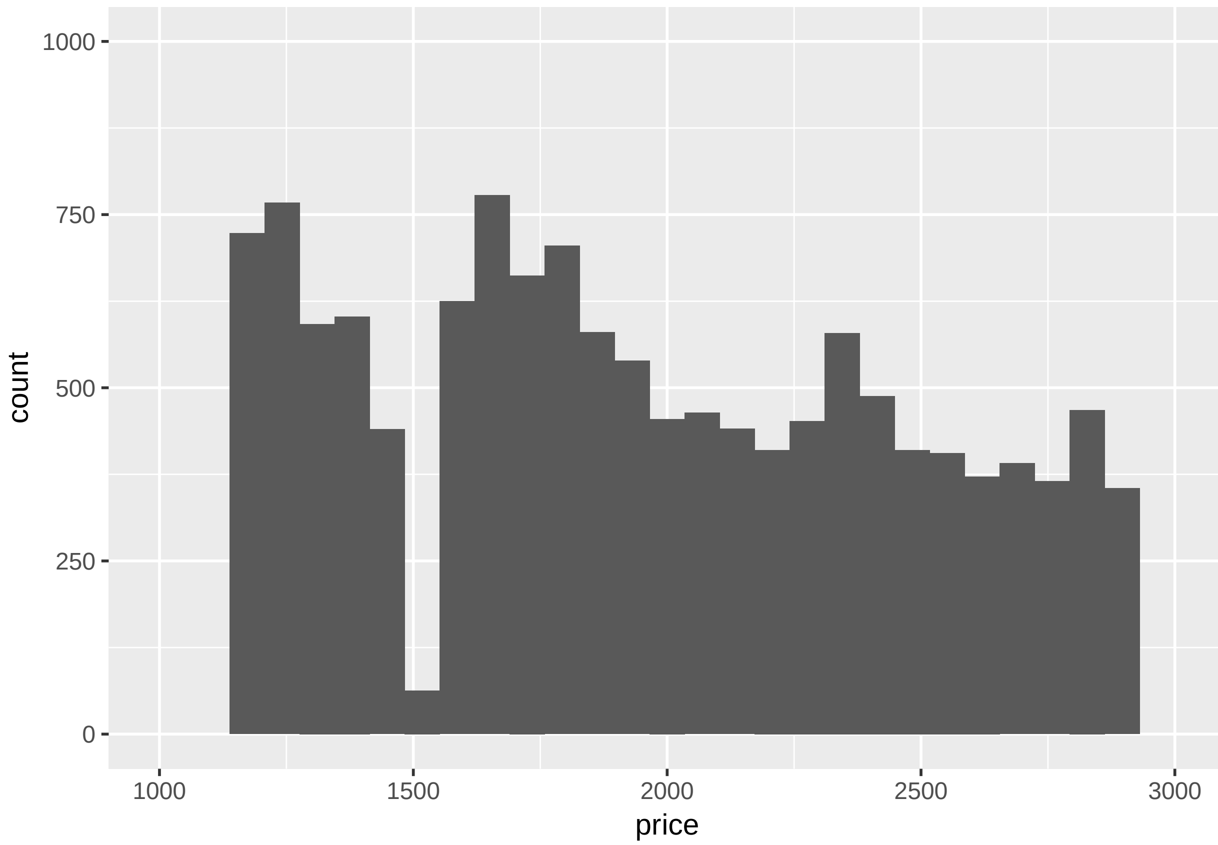
```r
diamonds %>% ggplot() +
    geom_histogram(mapping = aes(x = price)) +
    coord_cartesian(xlim = c(1000,3000), ylim = c(0, 1000))
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```




```r
diamonds %>% ggplot() +
    geom_histogram(aes(x=price)) +
    xlim(1000,3000)+
    ylim(0,1000)
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.

## Warning: Removed 38103 rows containing non-finite values (stat_bin).

## Warning: Removed 4 rows containing missing values (geom_bar).
```



7.4.1

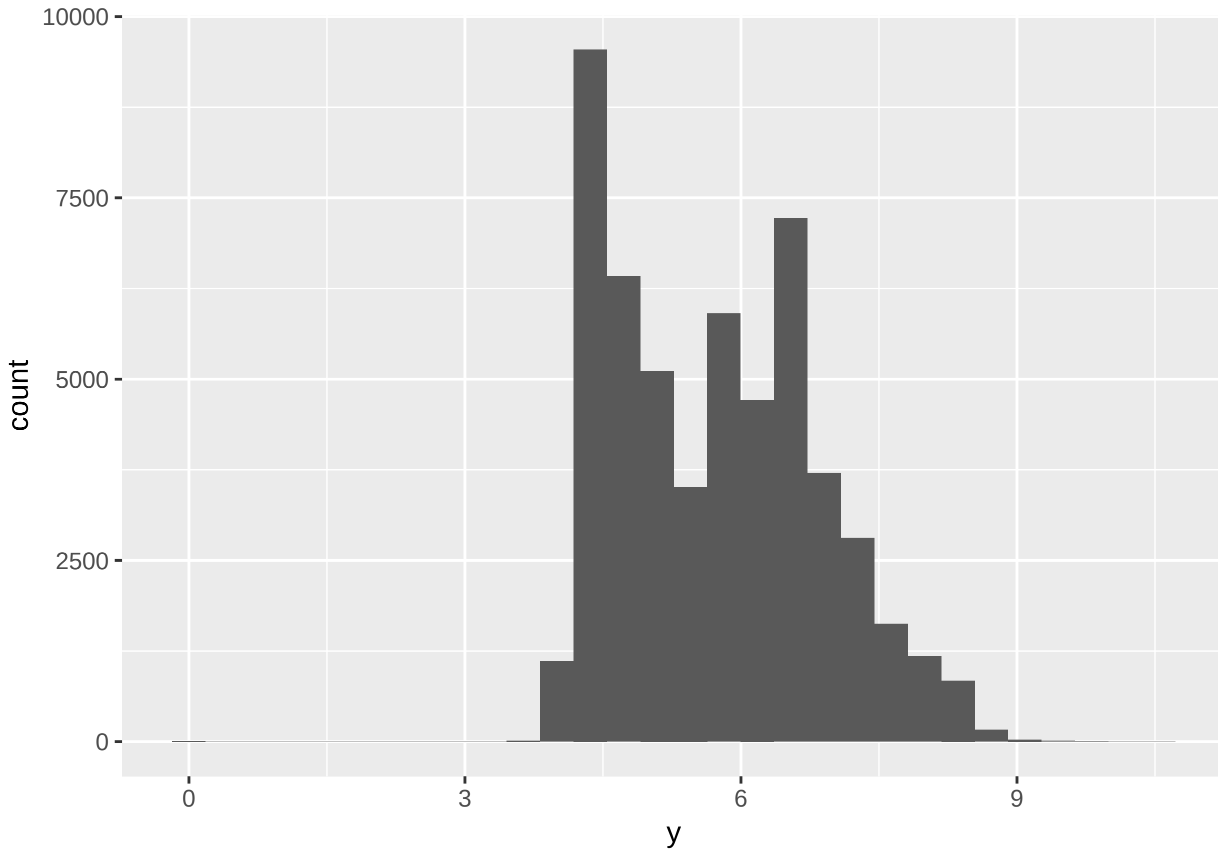
1

> What happens to missing values in a histogram? What happens to missing values in a bar chart? Why is there a difference?

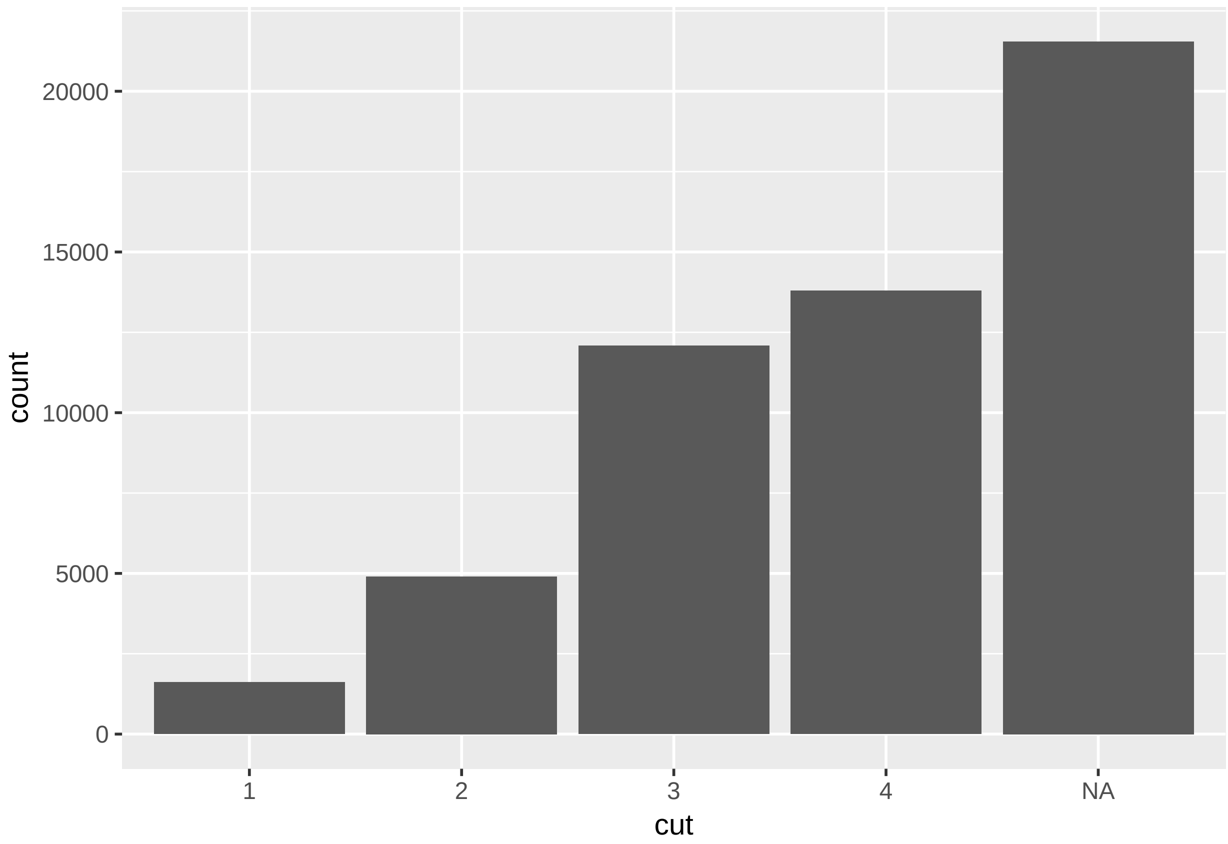
```
diamonds %>% mutate(y = ifelse(y > 20, NA_real_, y)) %>%
    ggplot(aes(x = y)) +
    geom_histogram()
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```

```
## Warning: Removed 2 rows containing non-finite values (stat_bin).
```




```r
diamonds %>% mutate(cut = ifelse(cut=="Ideal", NA_character_, cut)) %>%
    ggplot(aes(x = cut)) +
    geom_bar()
```



2

What does na.rm = TRUE do in mean() and sum()?

```
mean(c(0, 1, 2, NA), na.rm = TRUE)
```

```
## [1] 1
```

```
sum(c(0, 1, 2, NA), na.rm = TRUE)
```

```
## [1] 3
```

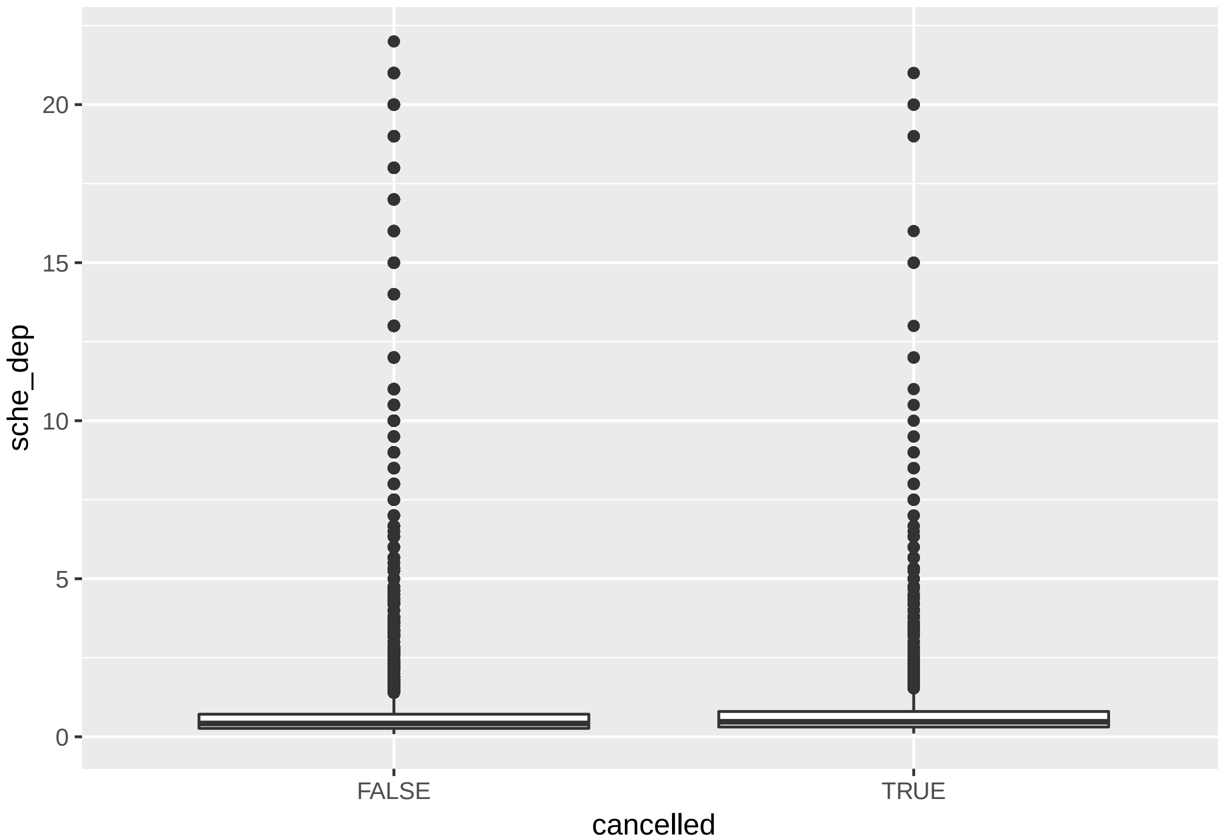
7.5.1

1

Use what you've learned to improve the visualization of the departure times of cancelled vs. non-cancelled flights.

```
nycflights13::flights %>%
    mutate(cancelled=is.na(dep_time), sche_dep=(sched_dep_time %/% 100)/(sched_dep_time %% 100)) %>%
    select(cancelled, sche_dep) %>%
    ggplot()+
    geom_boxplot(aes(y=sche_dep, x=cancelled))
```

```
## Warning: Removed 60696 rows containing non-finite values (stat_boxplot).
```



2

What variable in the diamonds dataset is most important for predicting the price of a diamond? How is that variable correlated with cut? Why does the combination of those two relationships lead to lower quality diamonds being more expensive?

```
broom::tidy(glm(diamonds$price ~ diamonds$carat + diamonds$cut + diamonds$color + diamonds$clarity))
```

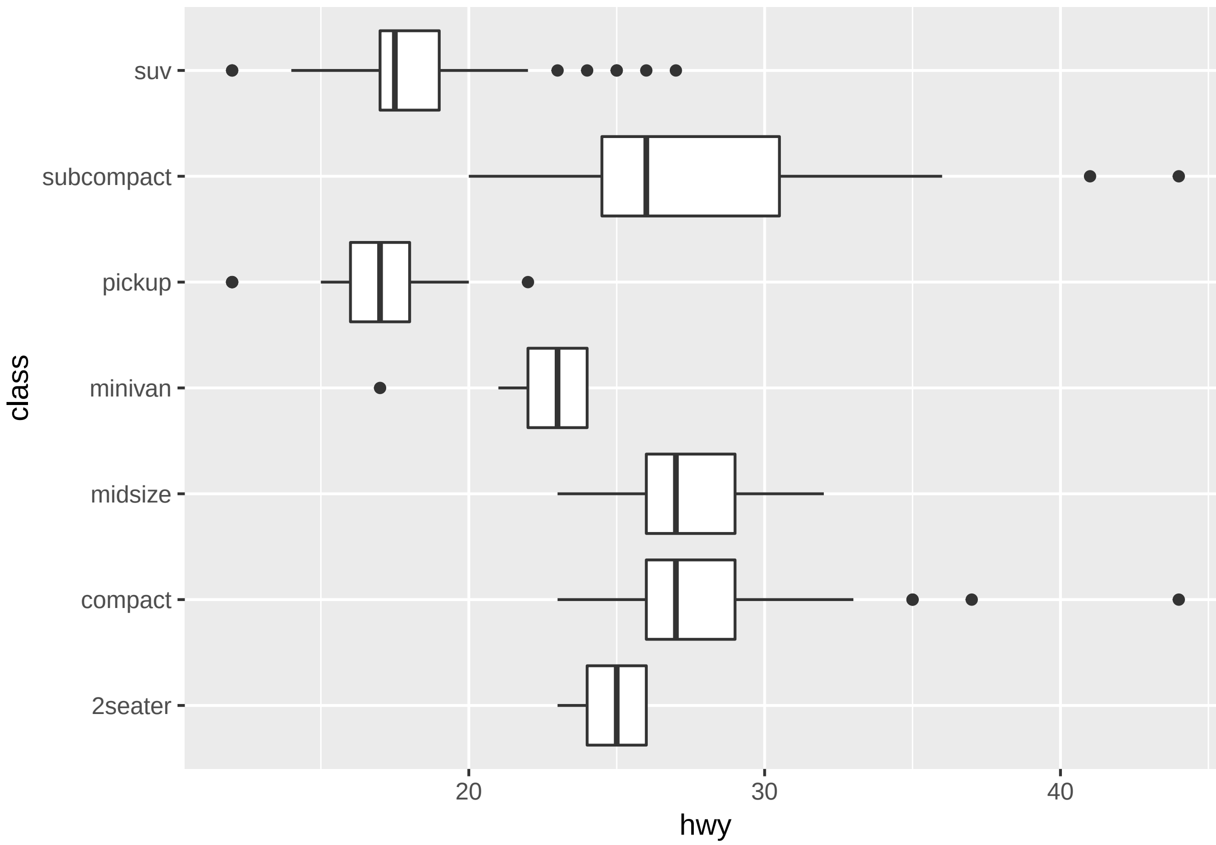
```
## # A tibble: 19 x 5
##    term                estimate std.error statistic   p.value
##    <chr>                  <dbl>     <dbl>     <dbl>     <dbl>
##  1 (Intercept)         -3711.        14.0 -265.     0.
##  2 diamonds$carat       8886.        12.0  738.     0.
##  3 diamonds$cut.L        699.        20.3   34.4    4.29e-256
##  4 diamonds$cut.Q       -328.        17.9  -18.3    1.52e- 74
##  5 diamonds$cut.C        181.        15.6   11.6    4.13e- 31
##  6 diamonds$cut^4         -1.21      12.5   -0.0969 9.23e-  1
##  7 diamonds$color.L    -1910.        17.7 -108.     0.
##  8 diamonds$color.Q     -628.        16.1  -39.0    0.
##  9 diamonds$color.C     -172.        15.1  -11.4    4.01e- 30
## 10 diamonds$color^4       21.7       13.8    1.57   1.17e-  1
## 11 diamonds$color^5      -85.9       13.1   -6.57   5.00e- 11
## 12 diamonds$color^6      -50.0       11.9   -4.20   2.62e-  5
## 13 diamonds$clarity.L  4218.        30.8  137.     0.
## 14 diamonds$clarity.Q -1832.        28.8  -63.6    0.
## 15 diamonds$clarity.C   923.        24.7   37.4    2.00e-302
## 16 diamonds$clarity^4  -362.        19.7  -18.3    6.82e- 75
## 17 diamonds$clarity^5   217.        16.1   13.4    3.76e- 41
```

```
## 18 diamonds$clarity^6     2.11      14.0    0.150  8.81e-  1
## 19 diamonds$clarity^7   110.        12.4    8.91   5.24e- 19
```

3

Install the ggstance package, and create a horizontal box plot. How does this compare to using `coord_flip()`?

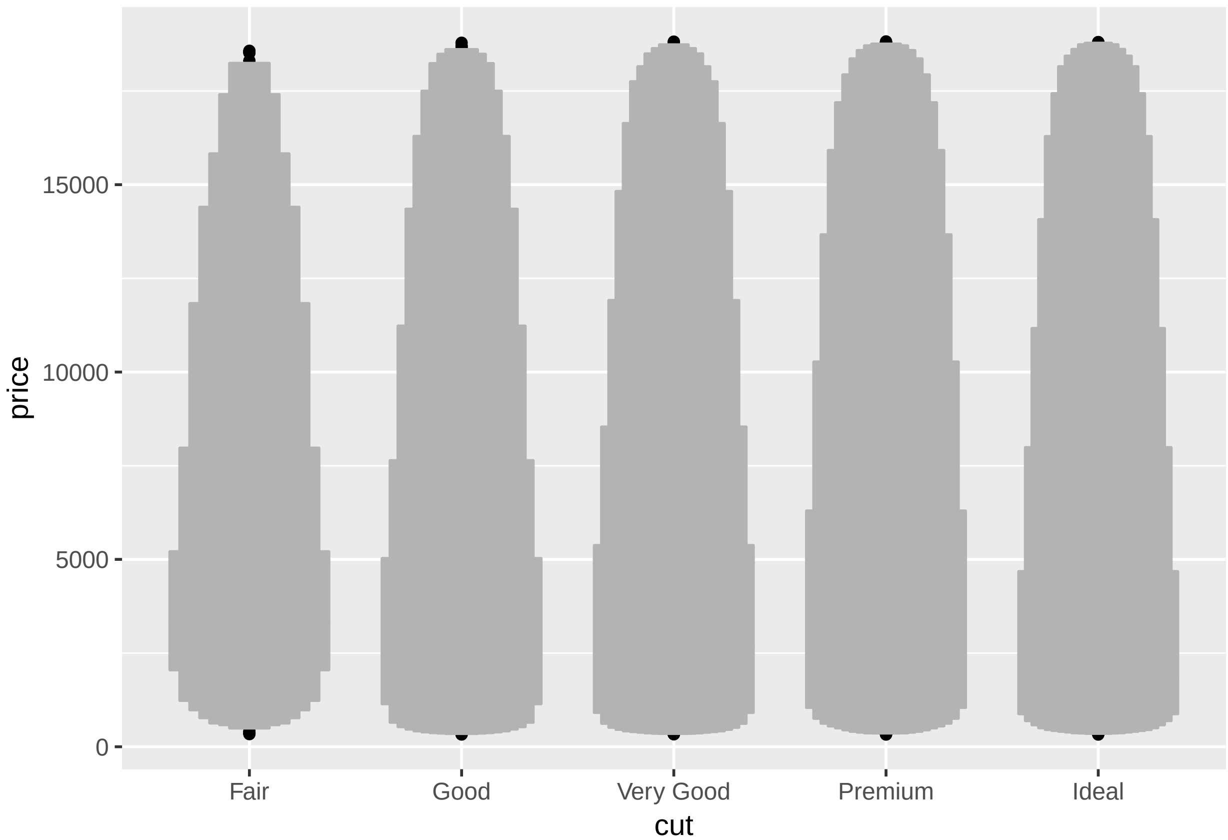
```r
mpg %>% ggplot() +
    geom_boxplot(aes(x = class, y = hwy)) +
    coord_flip()
```



4

One problem with box plots is that they were developed in an era of much smaller datasets and tend to display a prohibitively large number of "outlying values". One approach to remedy this problem is the letter value plot. Install the lvplot package, and try using `geom_lv()` to display the distribution of price vs cut. What do you learn? How do you interpret the plots?

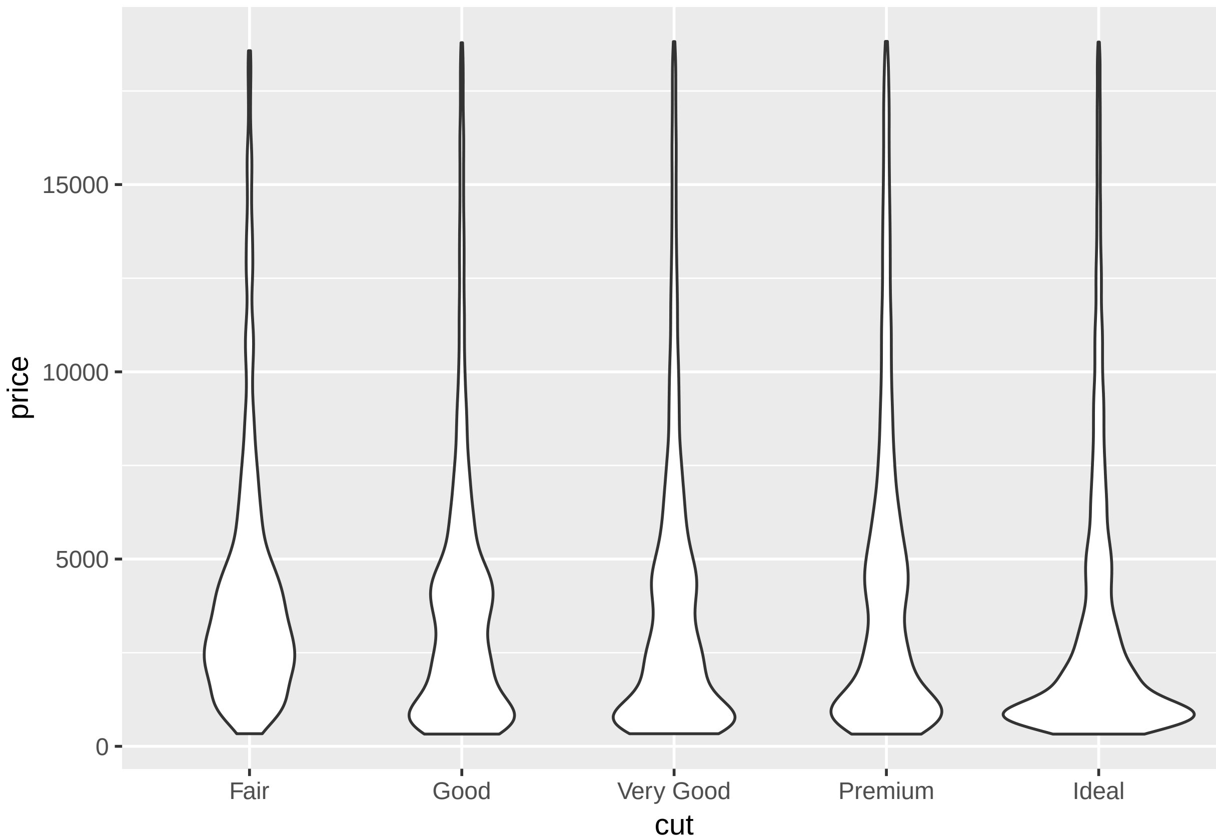
```r
library(lvplot)

diamonds %>% ggplot(aes(x=cut, y=price)) +
    geom_lv()
```



5

Compare and contrast `geom_violin()` with a faceted `geom_histogram()`, or a colored `geom_freqpoly()`. What are the pros and cons of each method?

```
diamonds %>% ggplot() +
    geom_violin(aes(x=cut, y=price))
```



`geom_violin` has a merit that distribution is easy to understand.

6

> If you have a small dataset, it's sometimes useful to use `geom_jitter()` to see the relationship between a continuous and categorical variable. The ggbeeswarm package provides a number of methods similar to `geom_jitter()`. List them and briefly describe what each one does.

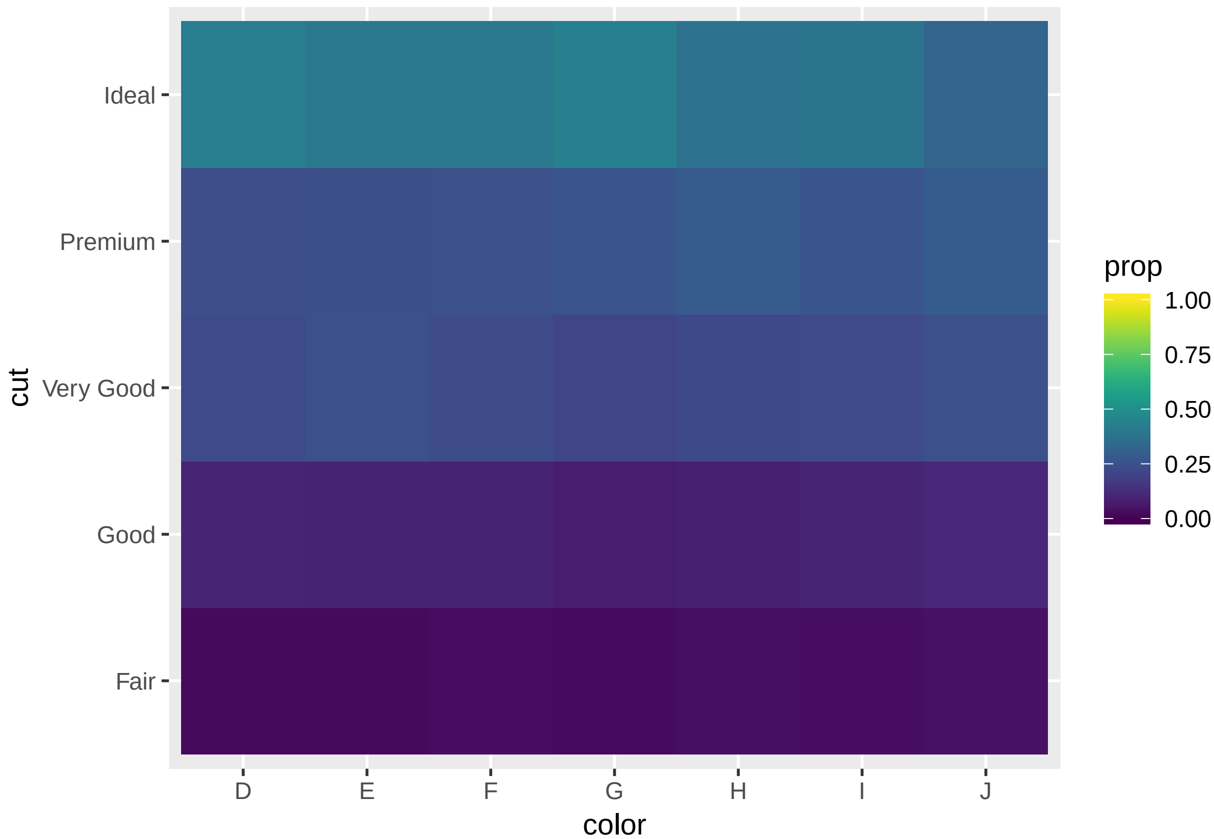
7.5.2

1

> How could you rescale the count dataset above to more clearly show the distribution of cut within color, or color within cut?

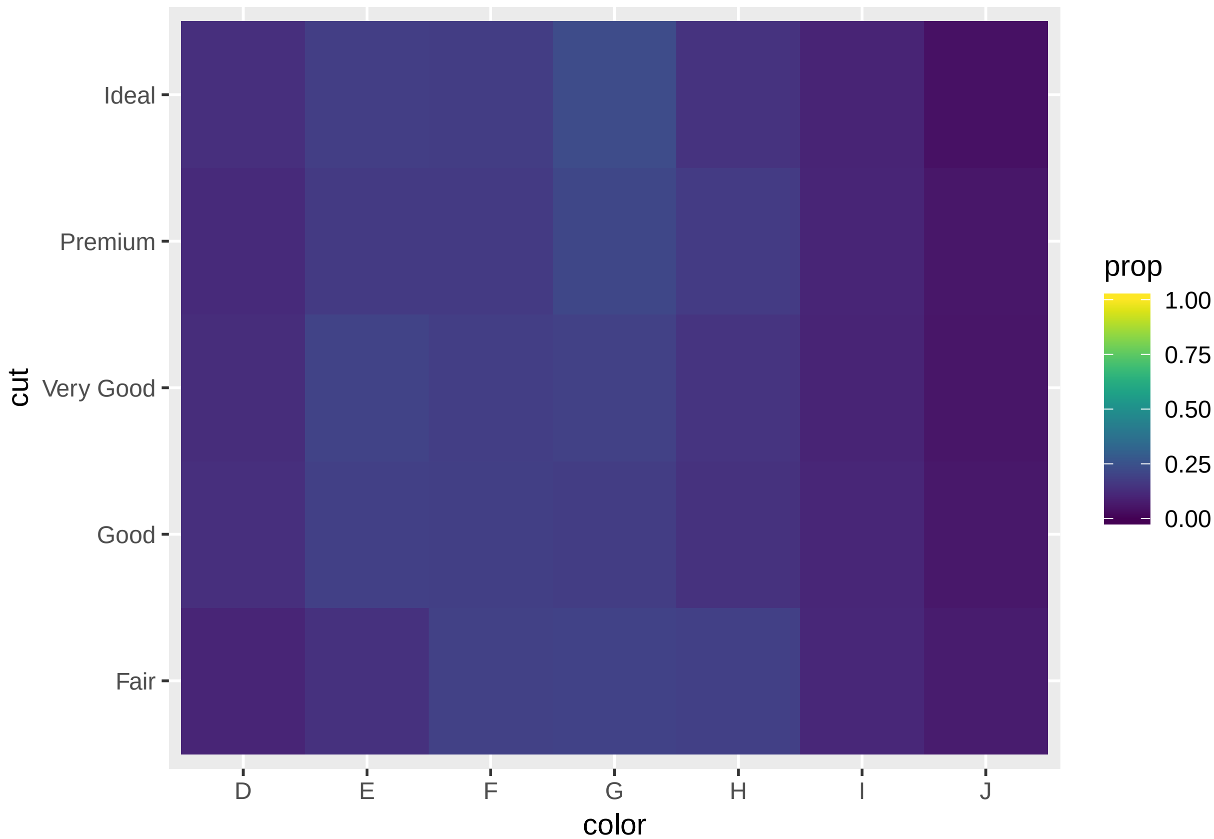
`cut` within `color`

```
library(viridis)

diamonds %>% count(color, cut) %>%
    group_by(color) %>%
    mutate(prop=n/sum(n)) %>%
    ggplot()+
    geom_tile(aes(x=color, y=cut, fill=prop))+
    scale_fill_viridis(limits=c(0,1))
```



color within cut

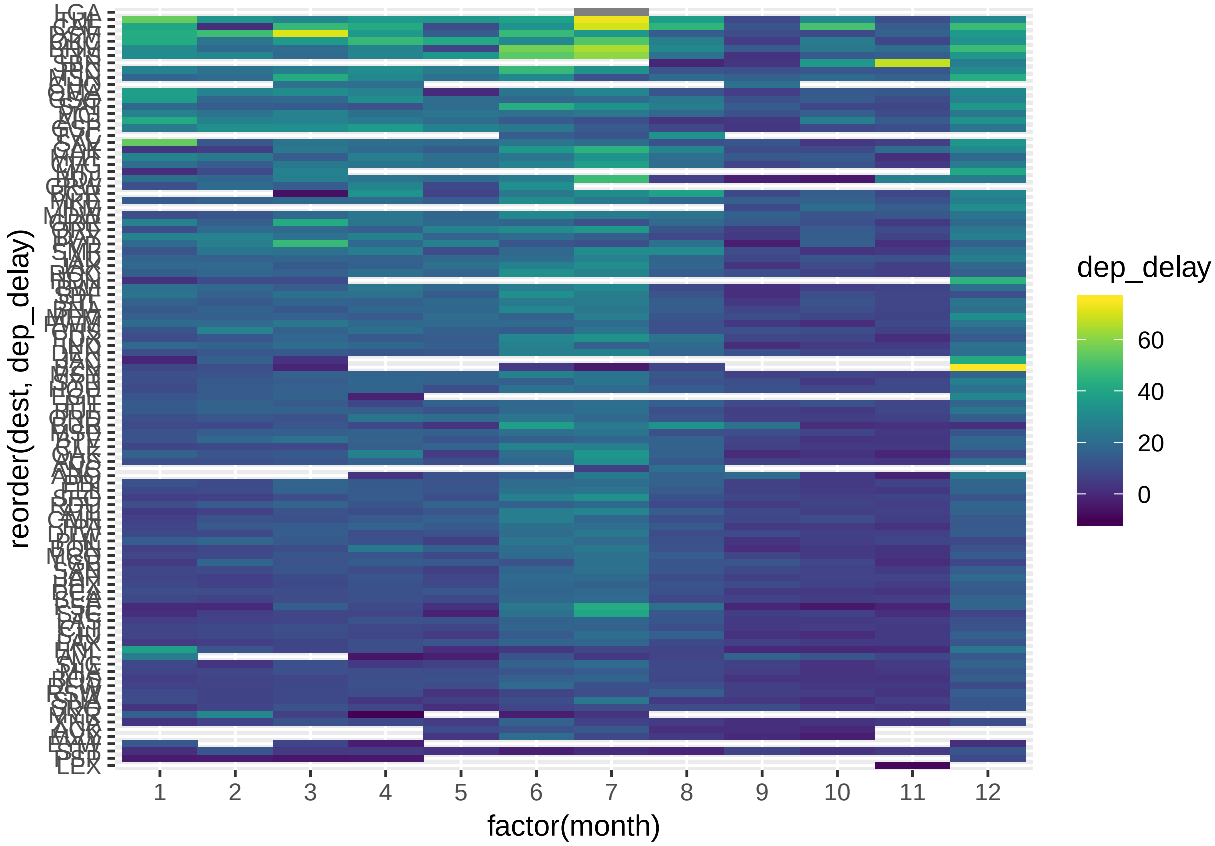
```
diamonds %>% count(color, cut) %>%
    group_by(cut) %>%
    mutate(prop=n/sum(n)) %>%
    ggplot()+
    geom_tile(aes(x=color, y=cut, fill=prop))+
    scale_fill_viridis(limits=c(0,1))
```



2

Use `geom_tile()` together with dplyr to explore how average flight delays vary by destination and month of year. What makes the plot difficult to read? How could you improve it?

```
nycflights13::flights %>%
    group_by(month, dest) %>%
    summarize(dep_delay = mean(dep_delay, na.rm = TRUE)) %>%
    ggplot(aes(x=factor(month), y=reorder(dest, dep_delay), fill=dep_delay)) +
    geom_tile() +
    scale_fill_viridis()
```

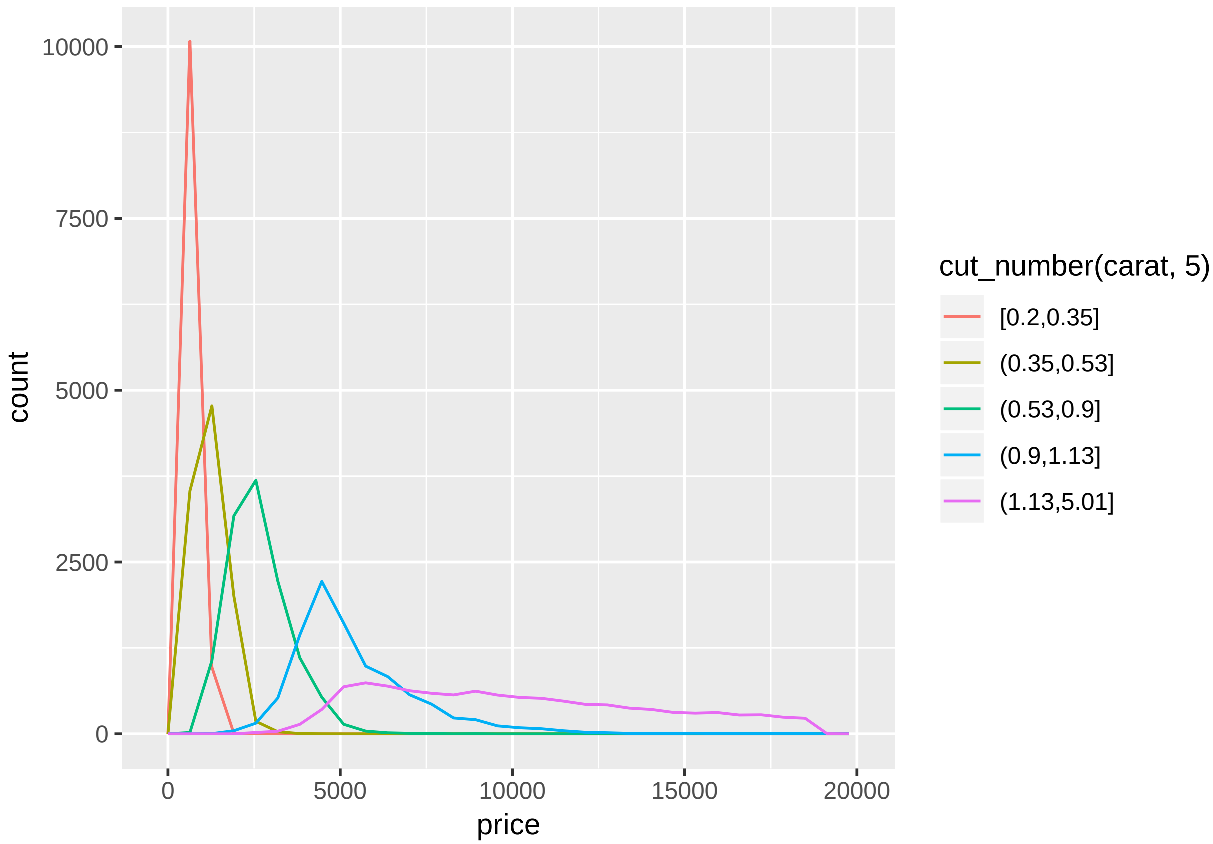


#
7.5.3 ## 1 > > Why is it slightly better to use aes(x = color, y = cut) rather than aes(x = cut, y = color) in the example above? >

`cut_number`

```r
diamonds %>% ggplot(aes(color=cut_number(carat, 5), x=price)) +
    geom_freqpoly()
```

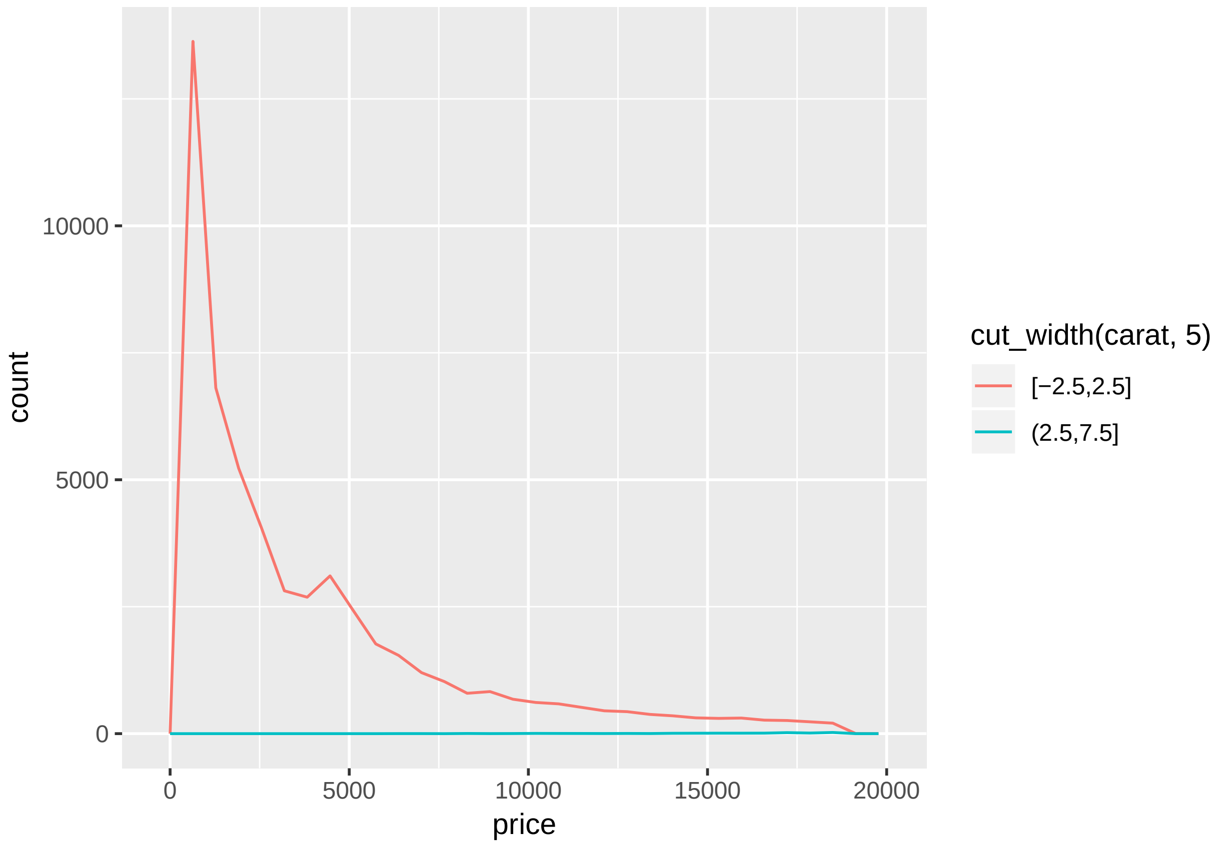
```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



cut_width

```
diamonds %>% ggplot(aes(color=cut_width(carat, 5), x=price)) +
    geom_freqpoly()
```

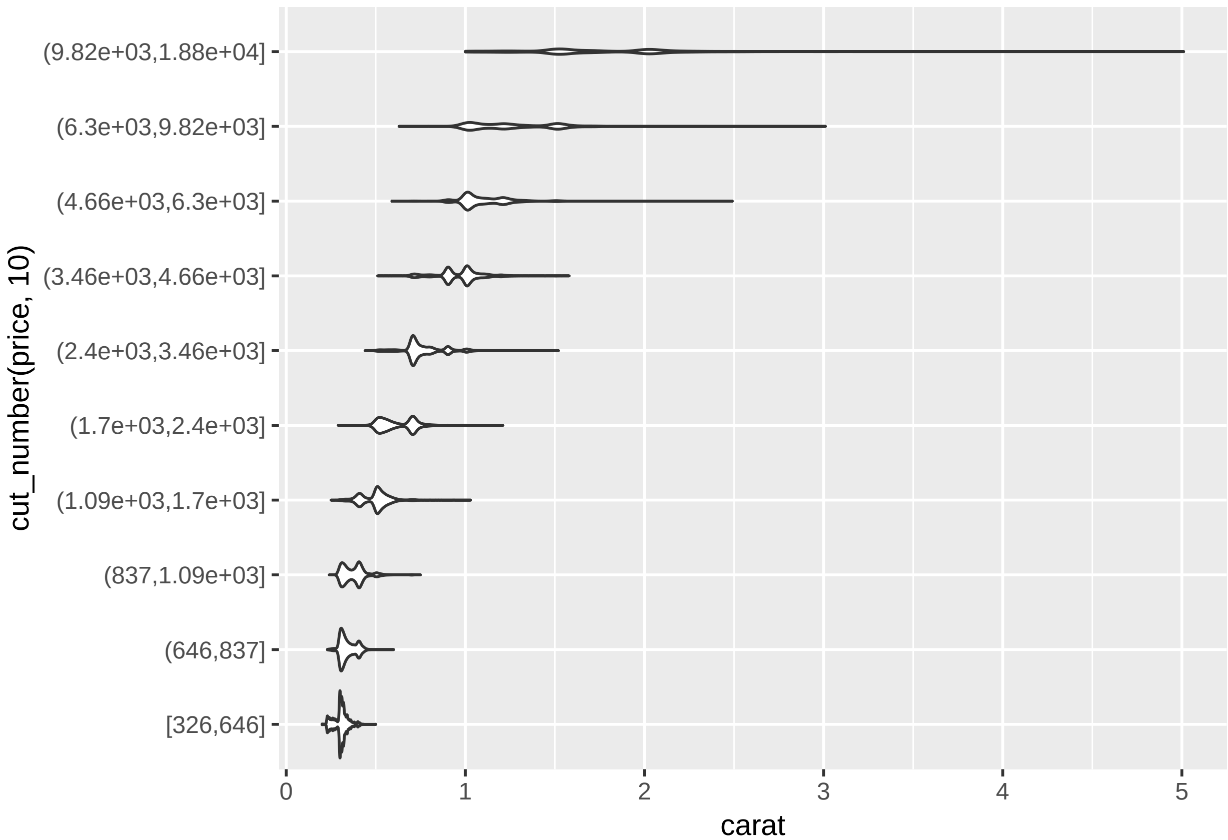
```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



2

Visualize the distribution of carat, partitioned by `price`.

```
diamonds %>% ggplot(aes(x=cut_number(price, 10), y=carat)) +
    geom_violin() +
    coord_flip()
```



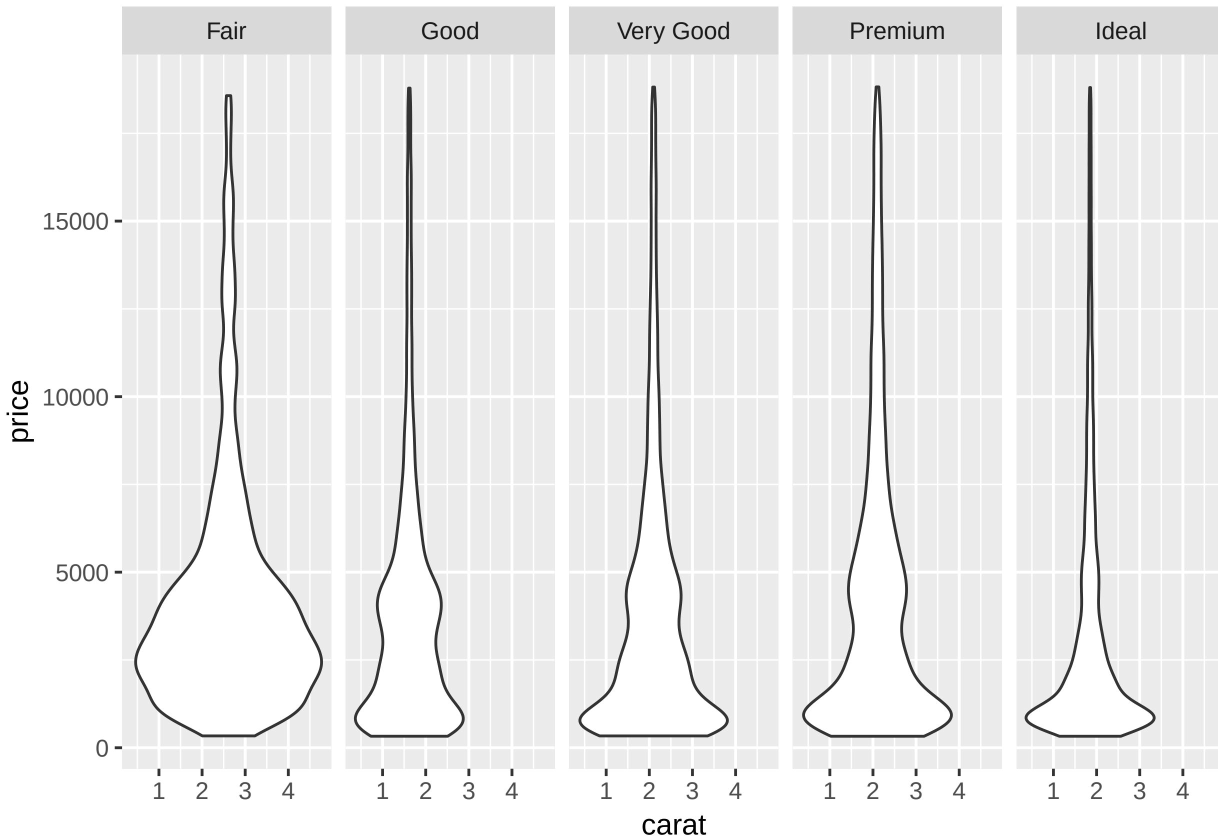
3

How does the price distribution of very large diamonds compare to small diamonds. Is it as you expect, or does it surprise you?

4

Combine two of the techniques you've learned to visualize the combined distribution of cut, carat, and price.

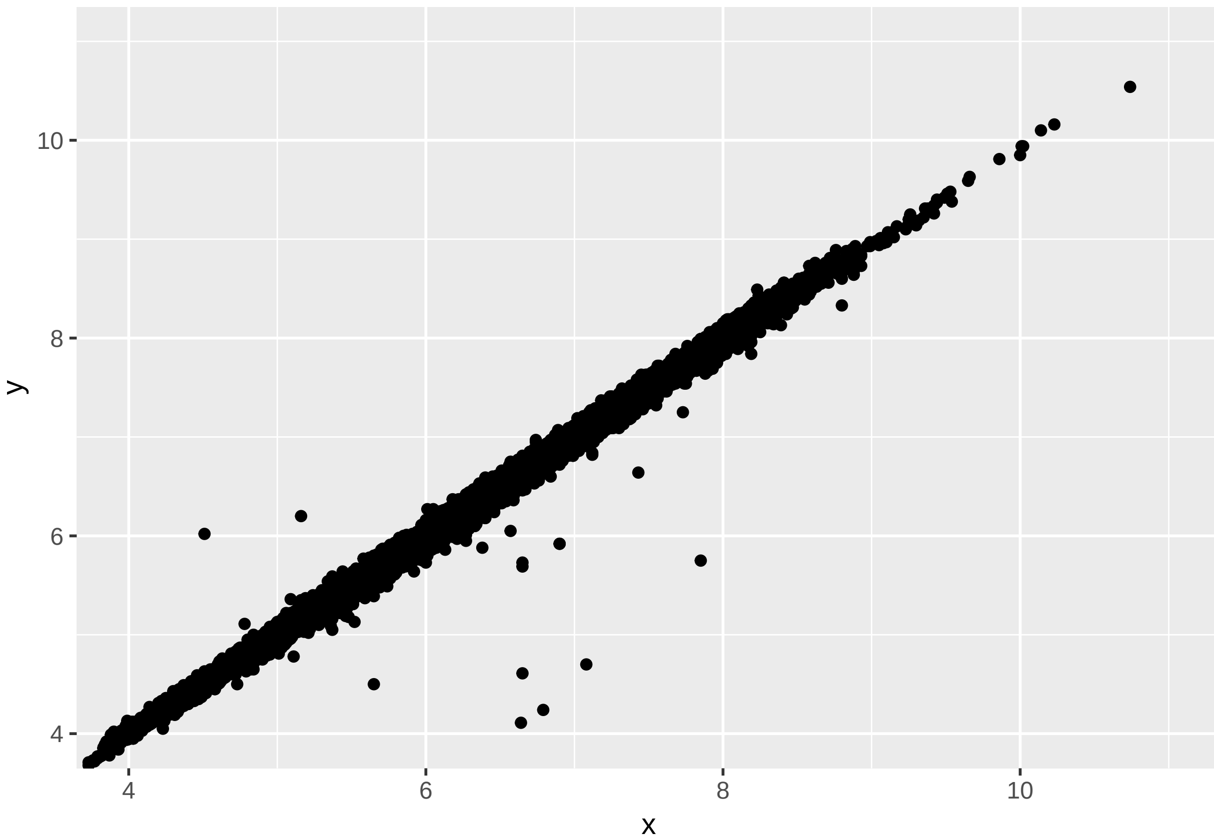
```
diamonds %>% ggplot(aes(x=carat, y=price)) +
    geom_violin() +
    facet_grid(~cut)
```



5

Two dimensional plots reveal outliers that are not visible in one dimensional plots. For example, some points in the plot below have an unusual combination of x and y values, which makes the points outliers even though their x and y values appear normal when examined separately.

```
ggplot(data = diamonds) +
  geom_point(mapping = aes(x = x, y = y)) +
  coord_cartesian(xlim = c(4, 11), ylim = c(4, 11))
```



>

> Why is a scatterplot a better display than a binned plot for this case? >

If there is a strong relationships between `x` and `y`, then you should use scatterplot.