# COMPSCIX 415.2 Homework 3

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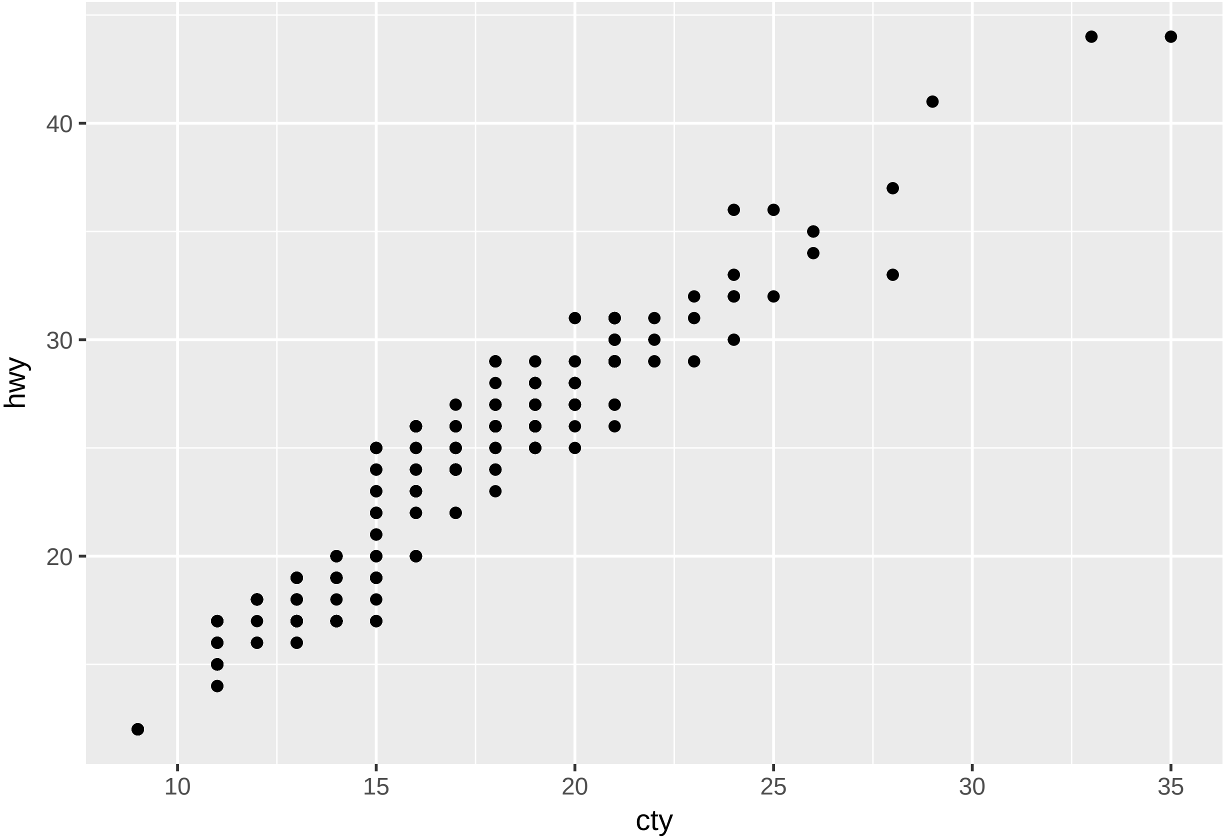
### **My Github repository for my assignments can be found at below URL: (https://github.com/santumagic/compscix-415-2assignments.git)**

```
library(tidyverse)
library(mdsr)
```

### Section 3.8.1: all excercises

#### QUESTION 1:

```
ggplot(data = mpg, mapping = aes(x = cty, y = hwy)) +
  geom_point()
```



#### ANSWER:

From the mpg dataset we know that cty and hwy both are continuous variables and when we plot them in a single plot, many data points will be overlapped especially for larger datasets. We can resolve this issue (overplotting) by using adjustment to jitter with position = “jitter” or by using geom_jitter () as shown below.

ggplot(data = mpg, mapping = aes(x = cty, y = hwy)) + geom_point() + geom_jitter()

**QUESTION 2:**

**ANSWER:**

## Lets find from the help function.

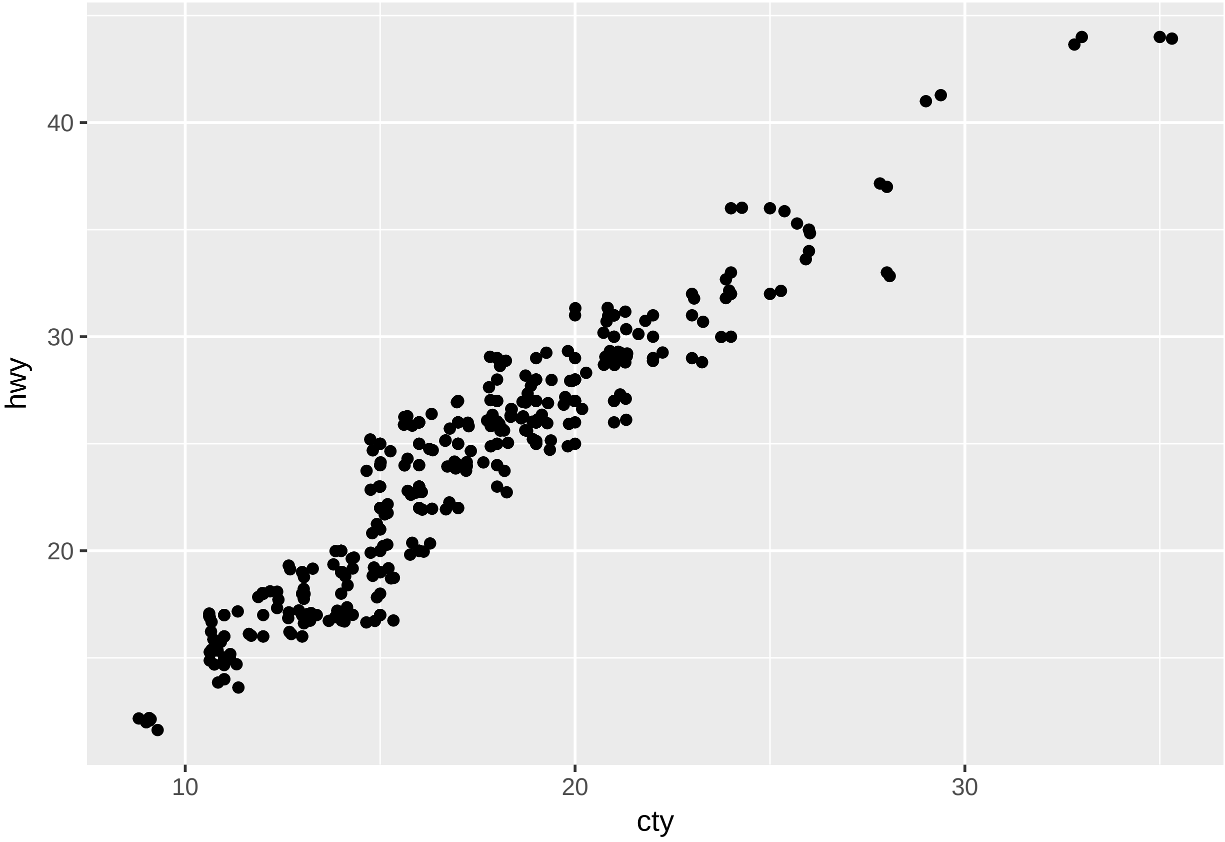
```
?geom_jitter
```

width and hight are the parameters that control the jittering.

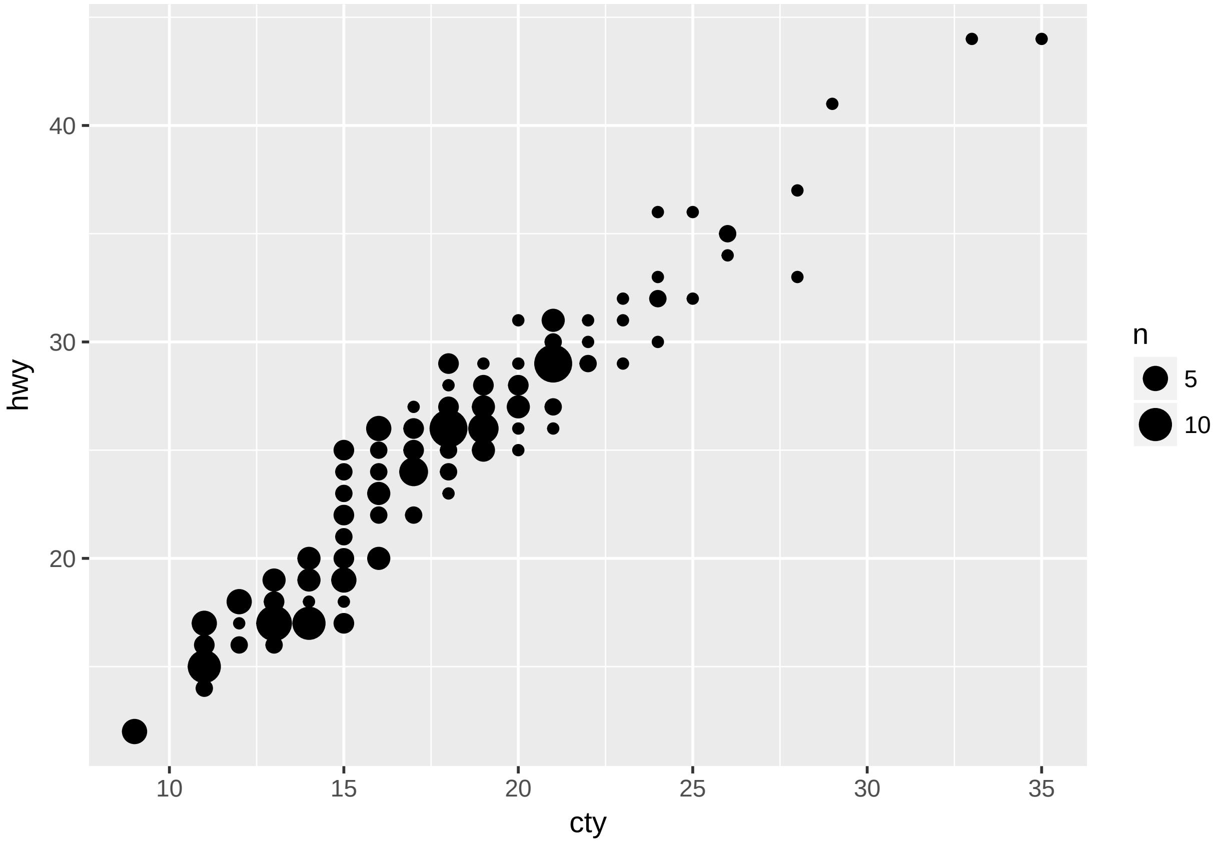
**QUESTION 3:**

**ANSWER:**

```
# geom_jitter()
ggplot(data = mpg, mapping = aes(x = cty, y = hwy)) +
  geom_point() +
  geom_jitter()
```



```
# geom_count()
ggplot(data = mpg, mapping = aes(x = cty, y = hwy)) +
  geom_point() +
  geom_count()
```



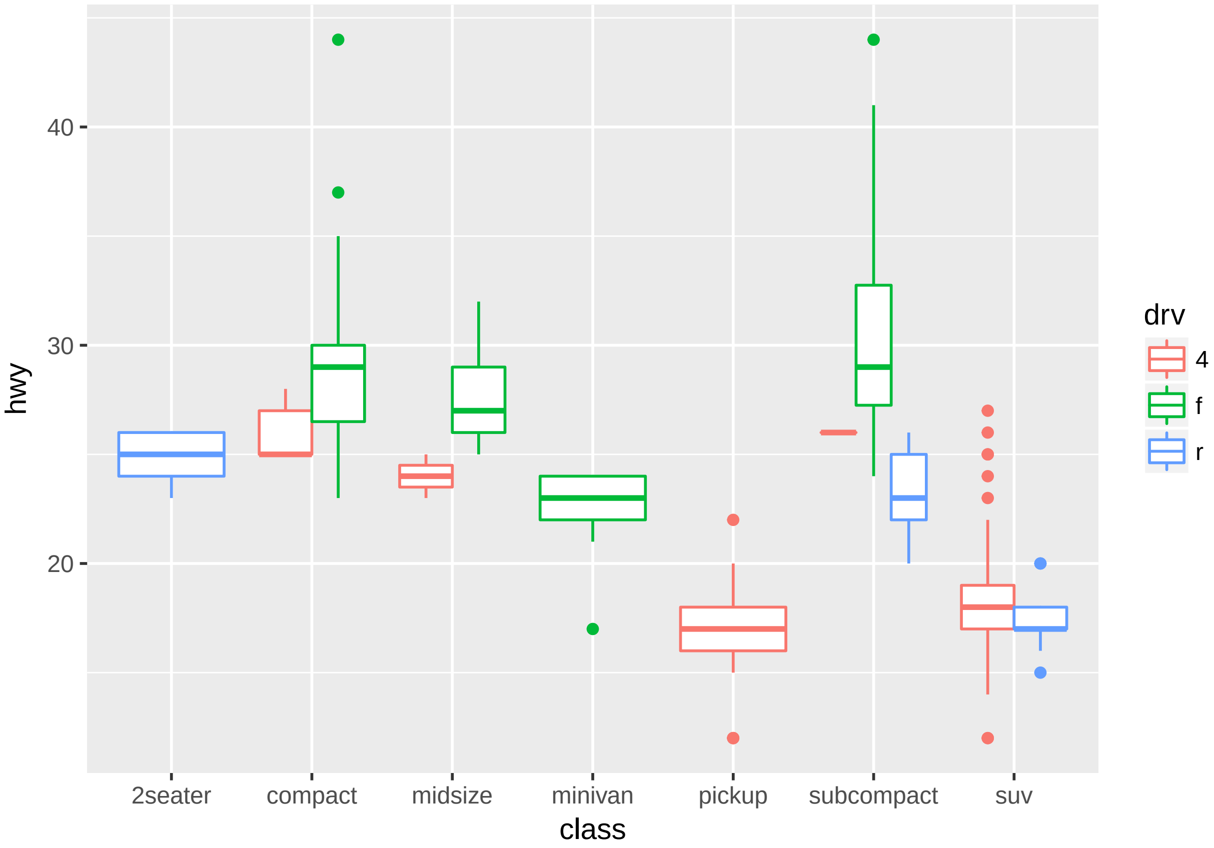
geom_count() is varient of geom_point and it basically it counts the number of data elements or observations at a point in the plot and then maps that count to the pointing area.

**QUESTION 4:**

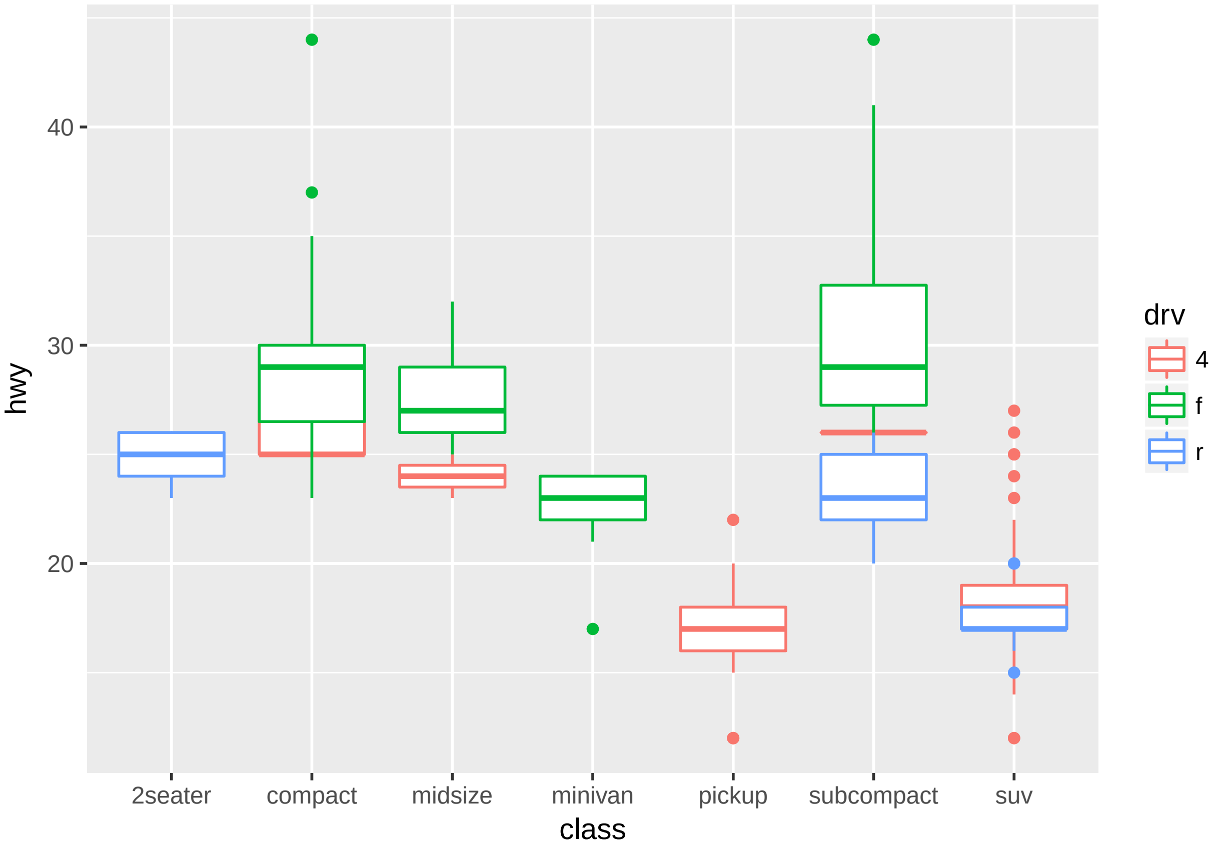
**ANSWER:**

By observing all the below graphs, we can conclude that **position = “dodge”** is the default position adjustment for a boxplot.

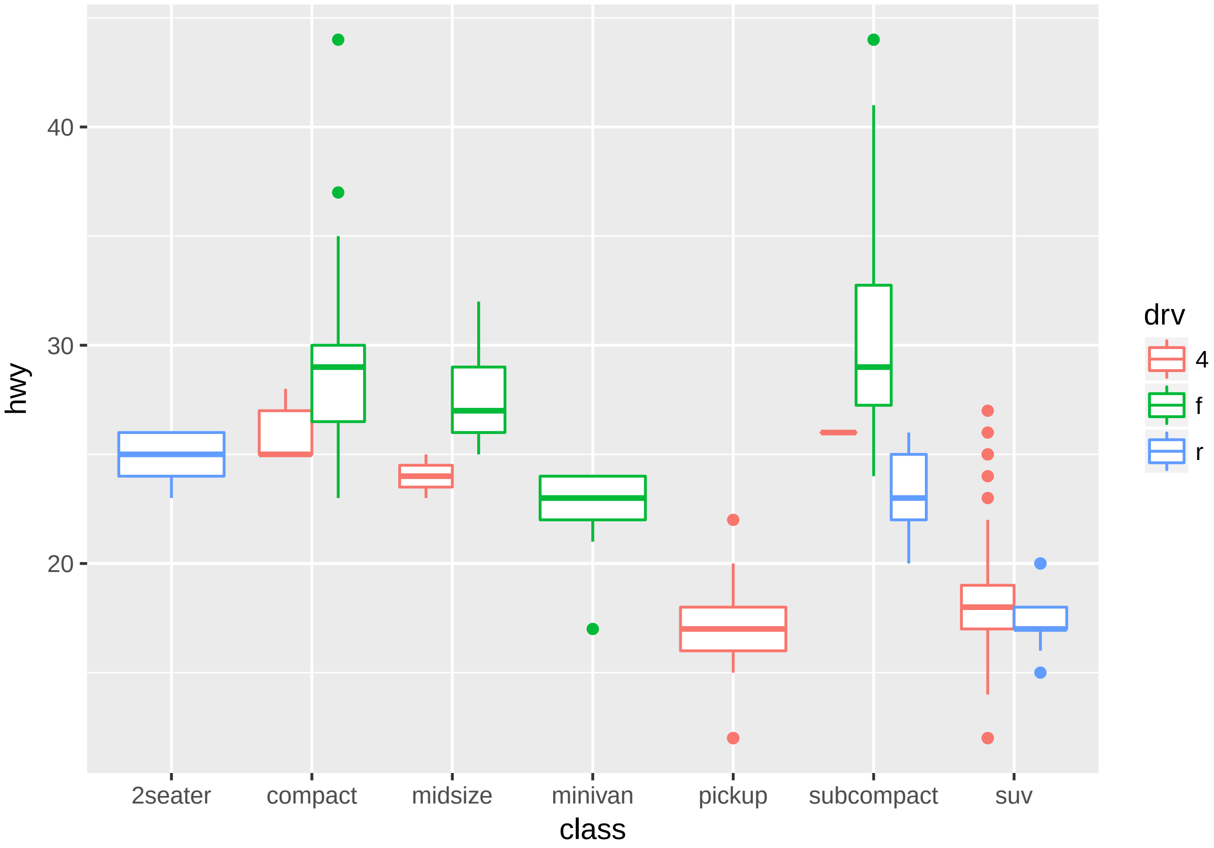
```
ggplot(data = mpg, mapping = aes(x = class, y = hwy, color = drv)) +
  geom_boxplot()
```



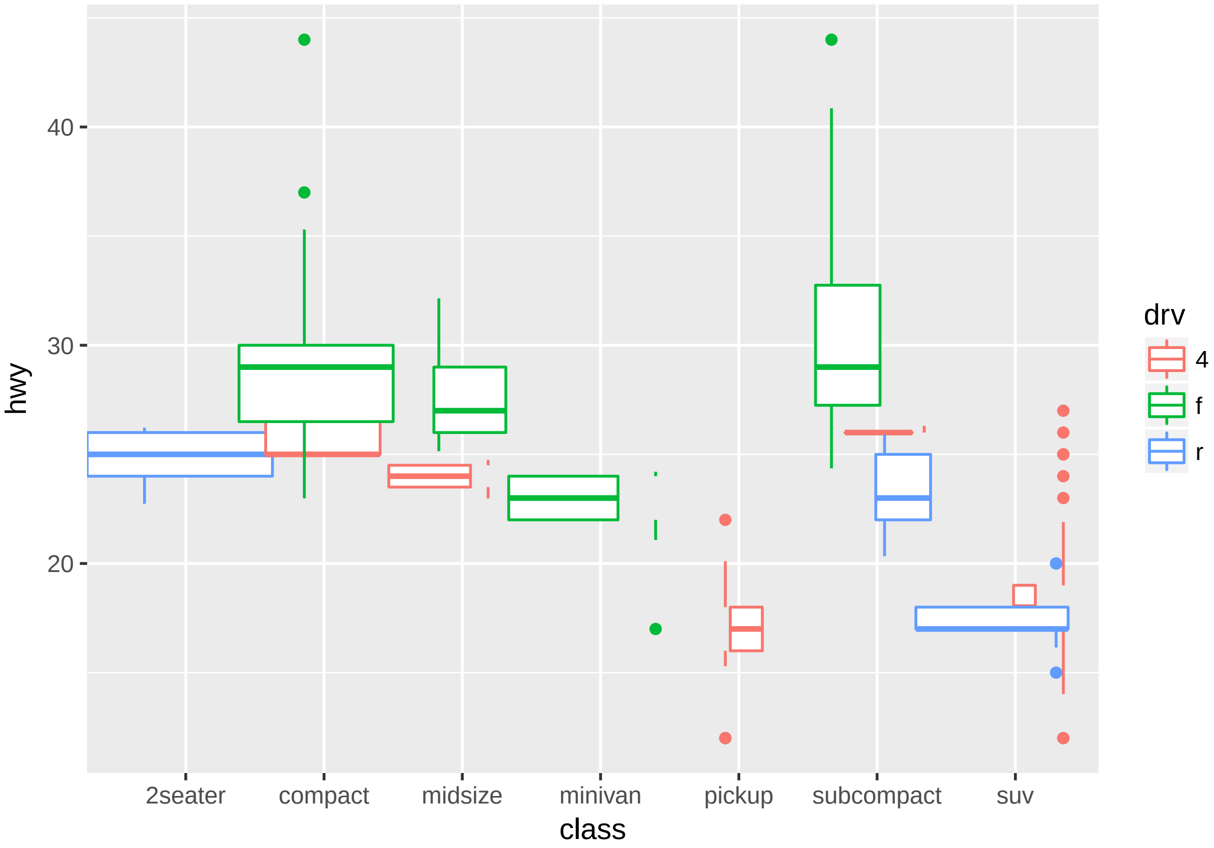
```r
# lets try all types of position adjustments

# position = "Identity"
ggplot(data = mpg, mapping = aes(x = class, y = hwy, color = drv)) +
  geom_boxplot(position = "Identity")
```



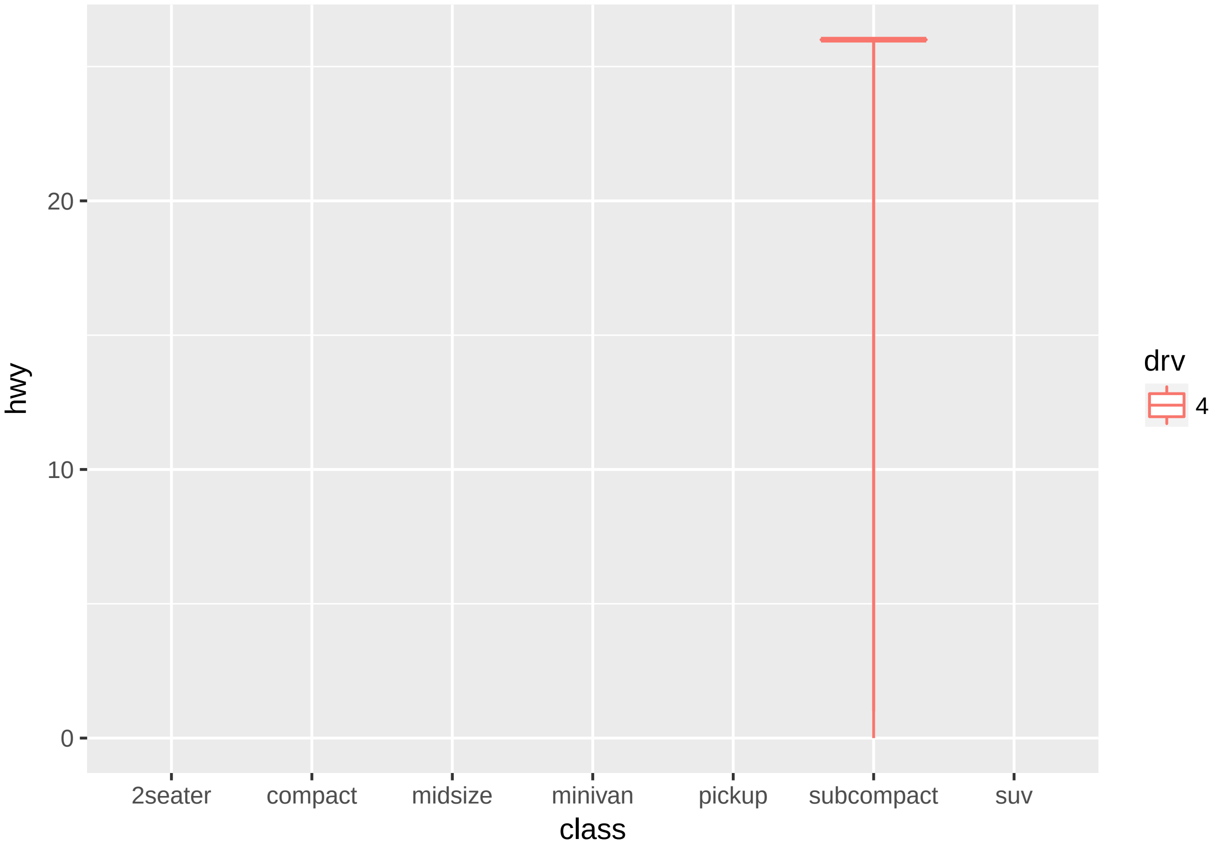
```
# position = "dodge"
ggplot(data = mpg, mapping = aes(x = class, y = hwy, color = drv)) +
  geom_boxplot (position = "dodge")
```



```
# position = "jitter"
ggplot(data = mpg, mapping = aes(x = class, y = hwy, color = drv)) +
  geom_boxplot (position = "jitter")
```



```
# position = "fill"
ggplot(data = mpg, mapping = aes(x = class, y = hwy, color = drv)) +
  geom_boxplot (position = "fill")
```



## Section 3.9.1: #2 and #4 only

**QUESTION 2:**

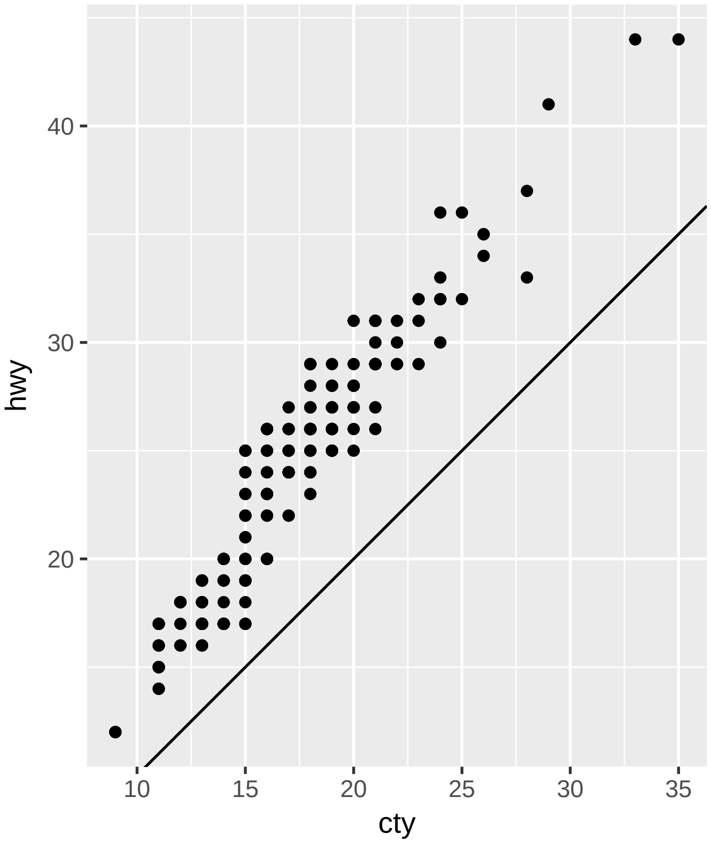
```
?labs ()
```

**ANSWER:**

labs will changes the lables for the axes. In addition we can use this for titles and substitles aswell.

**QUESTION 4:**

```
ggplot(data = mpg, mapping = aes(x = cty, y = hwy)) +
  geom_point() +
  geom_abline() +
  coord_fixed()
```



**ANSWER:**

– From the above graph it is observed that the both the variables are positively related to each other.
– coord_fixed is important because it is making sure that the coordinates for the both variables are fixed.
– geom_abline plots the slope between the variables cty and hwy.

## Section 4.4: #1 and #2 only

**QUESTION 1:**

my_variable <- 10 my_var1able

**ANSWER:**

There is a type in the second line. It should be : my_variable

**QUESTION 2:**

**ANSWER:**

ggplot(data = mpg) + geom_point(mapping = aes(x =displ, y = hwy))

filter(mpg, cyl == 8)
filter(diamonds, carat > 3)

## Data transformation

```
library(nycflights13)
library(tidyverse)
library(mdsr)
```

## Section 5.2.4: #1, #3 and #4 only

### QUESTION 1:

```
#1
(a <- filter(flights, arr_delay >= 120))
```

```
## # A tibble: 10,200 x 19
##     year month   day dep_time sched_dep_time dep_delay arr_time
##    <int> <int> <int>    <int>          <int>     <dbl>    <int>
##  1  2013     1     1      811            630       101     1047
##  2  2013     1     1      848           1835       853     1001
##  3  2013     1     1      957            733       144     1056
##  4  2013     1     1     1114            900       134     1447
##  5  2013     1     1     1505           1310       115     1638
##  6  2013     1     1     1525           1340       105     1831
##  7  2013     1     1     1549           1445        64     1912
##  8  2013     1     1     1558           1359       119     1718
##  9  2013     1     1     1732           1630        62     2028
## 10  2013     1     1     1803           1620       103     2008
## # ... with 10,190 more rows, and 12 more variables: sched_arr_time <int>,
## #   arr_delay <dbl>, carrier <chr>, flight <int>, tailnum <chr>,
## #   origin <chr>, dest <chr>, air_time <dbl>, distance <dbl>, hour <dbl>,
## #   minute <dbl>, time_hour <dttm>
```

```
#2
(b <- filter(flights, dest %in% c('IAH', 'HOU')))
```

```
## # A tibble: 9,313 x 19
##     year month   day dep_time sched_dep_time dep_delay arr_time
##    <int> <int> <int>    <int>          <int>     <dbl>    <int>
##  1  2013     1     1      517            515         2      830
##  2  2013     1     1      533            529         4      850
##  3  2013     1     1      623            627        -4      933
##  4  2013     1     1      728            732        -4     1041
##  5  2013     1     1      739            739         0     1104
##  6  2013     1     1      908            908         0     1228
##  7  2013     1     1     1028           1026         2     1350
##  8  2013     1     1     1044           1045        -1     1352
##  9  2013     1     1     1114            900       134     1447
## 10  2013     1     1     1205           1200         5     1503
## # ... with 9,303 more rows, and 12 more variables: sched_arr_time <int>,
## #   arr_delay <dbl>, carrier <chr>, flight <int>, tailnum <chr>,
## #   origin <chr>, dest <chr>, air_time <dbl>, distance <dbl>, hour <dbl>,
## #   minute <dbl>, time_hour <dttm>
```

```
#3
(c <- filter(flights, carrier %in% c('United','American','Delta')))
```

```
## # A tibble: 0 x 19
## # ... with 19 variables: year <int>, month <int>, day <int>,
## #   dep_time <int>, sched_dep_time <int>, dep_delay <dbl>, arr_time <int>,
## #   sched_arr_time <int>, arr_delay <dbl>, carrier <chr>, flight <int>,
## #   tailnum <chr>, origin <chr>, dest <chr>, air_time <dbl>,
## #   distance <dbl>, hour <dbl>, minute <dbl>, time_hour <dttm>
```

```
#4
(d <- filter(flights, month == 7 | month == 8 | month == 9))
```

```
## # A tibble: 86,326 x 19
##     year month   day dep_time sched_dep_time dep_delay arr_time
##    <int> <int> <int>    <int>          <int>     <dbl>    <int>
##  1  2013     7     1        1           2029       212      236
##  2  2013     7     1        2           2359         3      344
##  3  2013     7     1       29           2245       104      151
##  4  2013     7     1       43           2130       193      322
##  5  2013     7     1       44           2150       174      300
##  6  2013     7     1       46           2051       235      304
##  7  2013     7     1       48           2001       287      308
##  8  2013     7     1       58           2155       183      335
##  9  2013     7     1      100           2146       194      327
## 10  2013     7     1      100           2245       135      337
## # ... with 86,316 more rows, and 12 more variables: sched_arr_time <int>,
## #   arr_delay <dbl>, carrier <chr>, flight <int>, tailnum <chr>,
## #   origin <chr>, dest <chr>, air_time <dbl>, distance <dbl>, hour <dbl>,
## #   minute <dbl>, time_hour <dttm>
```

```
#5
(e <- filter(flights, arr_delay >= 120, dep_delay <= 0))
```

```
## # A tibble: 29 x 19
##     year month   day dep_time sched_dep_time dep_delay arr_time
##    <int> <int> <int>    <int>          <int>     <dbl>    <int>
##  1  2013     1    27     1419           1420        -1     1754
##  2  2013    10     7     1350           1350         0     1736
##  3  2013    10     7     1357           1359        -2     1858
##  4  2013    10    16      657            700        -3     1258
##  5  2013    11     1      658            700        -2     1329
##  6  2013     3    18     1844           1847        -3       39
##  7  2013     4    17     1635           1640        -5     2049
##  8  2013     4    18      558            600        -2     1149
##  9  2013     4    18      655            700        -5     1213
## 10  2013     5    22     1827           1830        -3     2217
## # ... with 19 more rows, and 12 more variables: sched_arr_time <int>,
## #   arr_delay <dbl>, carrier <chr>, flight <int>, tailnum <chr>,
## #   origin <chr>, dest <chr>, air_time <dbl>, distance <dbl>, hour <dbl>,
## #   minute <dbl>, time_hour <dttm>
```

```
#6
(f <- filter(flights, dep_delay >= 60, dep_delay - arr_delay >= 30))
```

```
## # A tibble: 2,074 x 19
##     year month   day dep_time sched_dep_time dep_delay arr_time
##    <int> <int> <int>    <int>          <int>     <dbl>    <int>
##  1  2013     1     1     1716           1545        91     2140
##  2  2013     1     1     2205           1720       285       46
##  3  2013     1     1     2326           2130       116      131
##  4  2013     1     3     1503           1221       162     1803
##  5  2013     1     3     1821           1530       171     2131
##  6  2013     1     3     1839           1700        99     2056
##  7  2013     1     3     1850           1745        65     2148
##  8  2013     1     3     1923           1815        68     2036
##  9  2013     1     3     1941           1759       102     2246
## 10  2013     1     3     1950           1845        65     2228
## # ... with 2,064 more rows, and 12 more variables: sched_arr_time <int>,
## #   arr_delay <dbl>, carrier <chr>, flight <int>, tailnum <chr>,
## #   origin <chr>, dest <chr>, air_time <dbl>, distance <dbl>, hour <dbl>,
## #   minute <dbl>, time_hour <dttm>
```

```
#7
(g <- filter(flights, dep_time >= 0, dep_time <= 600))
```

```
## # A tibble: 9,344 x 19
##     year month   day dep_time sched_dep_time dep_delay arr_time
##    <int> <int> <int>    <int>          <int>     <dbl>    <int>
##  1  2013     1     1      517            515         2      830
##  2  2013     1     1      533            529         4      850
##  3  2013     1     1      542            540         2      923
##  4  2013     1     1      544            545        -1     1004
##  5  2013     1     1      554            600        -6      812
##  6  2013     1     1      554            558        -4      740
##  7  2013     1     1      555            600        -5      913
##  8  2013     1     1      557            600        -3      709
##  9  2013     1     1      557            600        -3      838
## 10  2013     1     1      558            600        -2      753
## # ... with 9,334 more rows, and 12 more variables: sched_arr_time <int>,
## #   arr_delay <dbl>, carrier <chr>, flight <int>, tailnum <chr>,
## #   origin <chr>, dest <chr>, air_time <dbl>, distance <dbl>, hour <dbl>,
## #   minute <dbl>, time_hour <dttm>
```

## QUESTION 3:

```
# find dep_time having missing values
(dep_time_missing <- filter(flights, is.na(dep_time)))
```

```
## # A tibble: 8,255 x 19
##     year month   day dep_time sched_dep_time dep_delay arr_time
##    <int> <int> <int>    <int>          <int>     <dbl>    <int>
##  1  2013     1     1       NA           1630        NA       NA
##  2  2013     1     1       NA           1935        NA       NA
##  3  2013     1     1       NA           1500        NA       NA
##  4  2013     1     1       NA            600        NA       NA
##  5  2013     1     2       NA           1540        NA       NA
##  6  2013     1     2       NA           1620        NA       NA
##  7  2013     1     2       NA           1355        NA       NA
##  8  2013     1     2       NA           1420        NA       NA
##  9  2013     1     2       NA           1321        NA       NA
## 10  2013     1     2       NA           1545        NA       NA
## # ... with 8,245 more rows, and 12 more variables: sched_arr_time <int>,
## #   arr_delay <dbl>, carrier <chr>, flight <int>, tailnum <chr>,
## #   origin <chr>, dest <chr>, air_time <dbl>, distance <dbl>, hour <dbl>,
## #   minute <dbl>, time_hour <dttm>
```

**ANSWER 3:**

From the above dataset, the rows with missing dep_time are also missing the values for dep_delay and arr_time variables, that means they never departed and arrived which are only planned flights.

**QUESTION 4:**

```
(x <- NA ^ 0)
```

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

```
(y <- NA * TRUE)
```

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

```
(z <- FALSE - NA)
```

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

**ANSWER 4:**

In general, any mathematiocal operation with a missing value results another missing value and we need to ask explicitly for missing values in case of conditions.

## Section 5.4.1: #1 and #3 only

**QUESTION 1:**

```
# option 1
(opt_1 <- select(flights, dep_time, dep_delay, arr_time, arr_delay))
```

```
## # A tibble: 336,776 x 4
##    dep_time dep_delay arr_time arr_delay
##       <int>     <dbl>    <int>     <dbl>
##  1      517         2      830        11
##  2      533         4      850        20
##  3      542         2      923        33
##  4      544        -1     1004       -18
##  5      554        -6      812       -25
##  6      554        -4      740        12
##  7      555        -5      913        19
##  8      557        -3      709       -14
##  9      557        -3      838        -8
## 10      558        -2      753         8
## # ... with 336,766 more rows
```

```
# option 2
(opt_2 <- select(flights, starts_with("dep"), starts_with("arr")))
```

```
## # A tibble: 336,776 x 4
##    dep_time dep_delay arr_time arr_delay
##       <int>     <dbl>    <int>     <dbl>
##  1      517         2      830        11
##  2      533         4      850        20
##  3      542         2      923        33
##  4      544        -1     1004       -18
##  5      554        -6      812       -25
##  6      554        -4      740        12
##  7      555        -5      913        19
##  8      557        -3      709       -14
##  9      557        -3      838        -8
## 10      558        -2      753         8
## # ... with 336,766 more rows
```

```
# option 3
(opt_3 <- select(flights, contains("delay"), dep_time, arr_time))
```

```
## # A tibble: 336,776 x 4
##    dep_delay arr_delay dep_time arr_time
##        <dbl>     <dbl>    <int>    <int>
##  1         2        11      517      830
##  2         4        20      533      850
##  3         2        33      542      923
##  4        -1       -18      544     1004
##  5        -6       -25      554      812
##  6        -4        12      554      740
##  7        -5        19      555      913
##  8        -3       -14      557      709
##  9        -3        -8      557      838
## 10        -2         8      558      753
## # ... with 336,766 more rows
```

```
# option 4
((opt_4 <- select(flights, ends_with("delay"), dep_time, arr_time)))
```

```
## # A tibble: 336,776 x 4
##    dep_delay arr_delay dep_time arr_time
##        <dbl>     <dbl>    <int>    <int>
##  1         2        11      517      830
##  2         4        20      533      850
##  3         2        33      542      923
##  4        -1       -18      544     1004
##  5        -6       -25      554      812
##  6        -4        12      554      740
##  7        -5        19      555      913
##  8        -3       -14      557      709
##  9        -3        -8      557      838
## 10        -2         8      558      753
## # ... with 336,766 more rows
```

### QUESTION 3:

```
vars <- c("year", "month", "day", "dep_delay", "arr_delay")
(one_of_func <- select(flights, one_of(vars)))
```

```
## # A tibble: 336,776 x 5
##     year month   day dep_delay arr_delay
##    <int> <int> <int>     <dbl>     <dbl>
##  1  2013     1     1         2        11
##  2  2013     1     1         4        20
##  3  2013     1     1         2        33
##  4  2013     1     1        -1       -18
##  5  2013     1     1        -6       -25
##  6  2013     1     1        -4        12
##  7  2013     1     1        -5        19
##  8  2013     1     1        -3       -14
##  9  2013     1     1        -3        -8
## 10  2013     1     1        -2         8
## # ... with 336,766 more rows
```

### ANSWER 4:

when we use one_of() with select, the select function will pulls all the matching variables mentioned in the vector strings from the data frame.