p8105_hw1_yx2507

```r
library(tidyverse)
```

```
## -- Attaching packages ------------------------------------------------------------------------------

## v ggplot2 3.2.1     v purrr   0.3.2
## v tibble  2.1.3     v dplyr   0.8.3
## v tidyr   0.8.3     v stringr 1.4.0
## v readr   1.3.1     v forcats 0.4.0

## -- Conflicts ---------------------------------------------------------------------------------------
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

problem 1

making data frame

Create a data frame comprised of: a random sample of size 8 from a standard Normal distribution; a logical vector indicating whether elements of the sample are greater than 0; a character vector of length 8; a factor vector of length 8, with 3 different factor "levels". Below shows the code and the result:

```r
 problem_1=tibble(
   vec_numeric=rnorm(8),
   vec_logical=vec_numeric>0,
   vec_char=c("a","b","c","d","e","f","g","h"),
   vec_factor = factor(c("M","F","M","F","M","F","M","F"))

 )
#CHECK DATA FRAME
problem_1
```

```
## # A tibble: 8 x 4
##   vec_numeric vec_logical vec_char vec_factor
##         <dbl> <lgl>       <chr>    <fct>
## 1       2.43  TRUE        a        M
## 2      -0.138 FALSE       b        F
## 3      -0.547 FALSE       c        M
## 4       0.441 TRUE        d        F
## 5      -0.962 FALSE       e        M
## 6       0.485 TRUE        f        F
## 7       1.18  TRUE        g        M
## 8      -0.213 FALSE       h        F
```

now take the mean

The result shows that numeric vairable and logical variable work while factor and character vairable can't get the mean.

```
mean(problem_1$vec_numeric)
```

```
## [1] 0.3346817
```

```
mean(problem_1$vec_logical)
```

```
## [1] 0.5
```

```
mean(problem_1$vec_char)
```

```
## Warning in mean.default(problem_1$vec_char): argument is not numeric or
## logical: returning NA
```

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

```
mean(problem_1$vec_fator)
```

```
## Warning: Unknown or uninitialised column: 'vec_fator'.
```

```
## Warning in mean.default(problem_1$vec_fator): argument is not numeric or
## logical: returning NA
```

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

Conercion

Tn the below steps: * convert the logical vector to numeric, and multiply the random sample by the result * convert the logical vector to a factor, and multiply the random sample by the result * convert the logical vector to a factor and then convert the result to numeric, and multiply the random sample by the result

```
as.numeric(problem_1$vec_char)
```

```
## Warning: NAs introduced by coercion
```

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

```
as.numeric(problem_1$vec_logical)
```

```
## [1] 1 0 0 1 0 1 1 0
```

```
as.numeric(problem_1$vec_factor)
```

```
## [1] 2 1 2 1 2 1 2 1
```

coercision can change charactor vairable into N/A but can't convert to numeric variable. So it can't be calculated mean. While for logical variable, when converting to numerica vairables, "True" and "False" can be covert to 1 and 0 respectively. For factor variable, they can convert to the number indicating its level.

multiply by random sample

```r
as.numeric(problem_1$vec_logical)*rnorm(8)
```

```
## [1] -1.2205922  0.0000000  0.0000000 -0.5711342  0.0000000  0.5427978
## [7]  0.0720127  0.0000000
```

```r
as.factor(problem_1$vec_logical)*rnorm(8)
```

```
## Warning in Ops.factor(as.factor(problem_1$vec_logical), rnorm(8)): '*' not
## meaningful for factors
```

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

```r
as.numeric(as.factor(problem_1$vec_logical))*rnorm(8)
```

```
## [1]  0.29355354 -0.05303060 -0.07111764 -0.81446694  0.72973836 -1.26967685
## [7]  5.16783793 -2.17251296
```

Problem 2 Including Plots

Create data frame

Create a data frame comprised of: x: a random sample of size 500 from a standard Normal distribution y: a random sample of size 500 from a standard Normal distribution A logical vector indicating whether x + y > 1 A numeric vector created by coercing the above logical vector A factor vector created by coercing the above logical vector

```r
set.seed(2)
  x=rnorm(500)
  y=rnorm(500)
  vec_logical_plot= x + y > 1
  vec_num = as.numeric(vec_logical_plot)
  vec_fact = as.factor(vec_logical_plot)

plot_df=tibble(x,y,vec_logical_plot,vec_fact,vec_num)

head(plot_df)
```

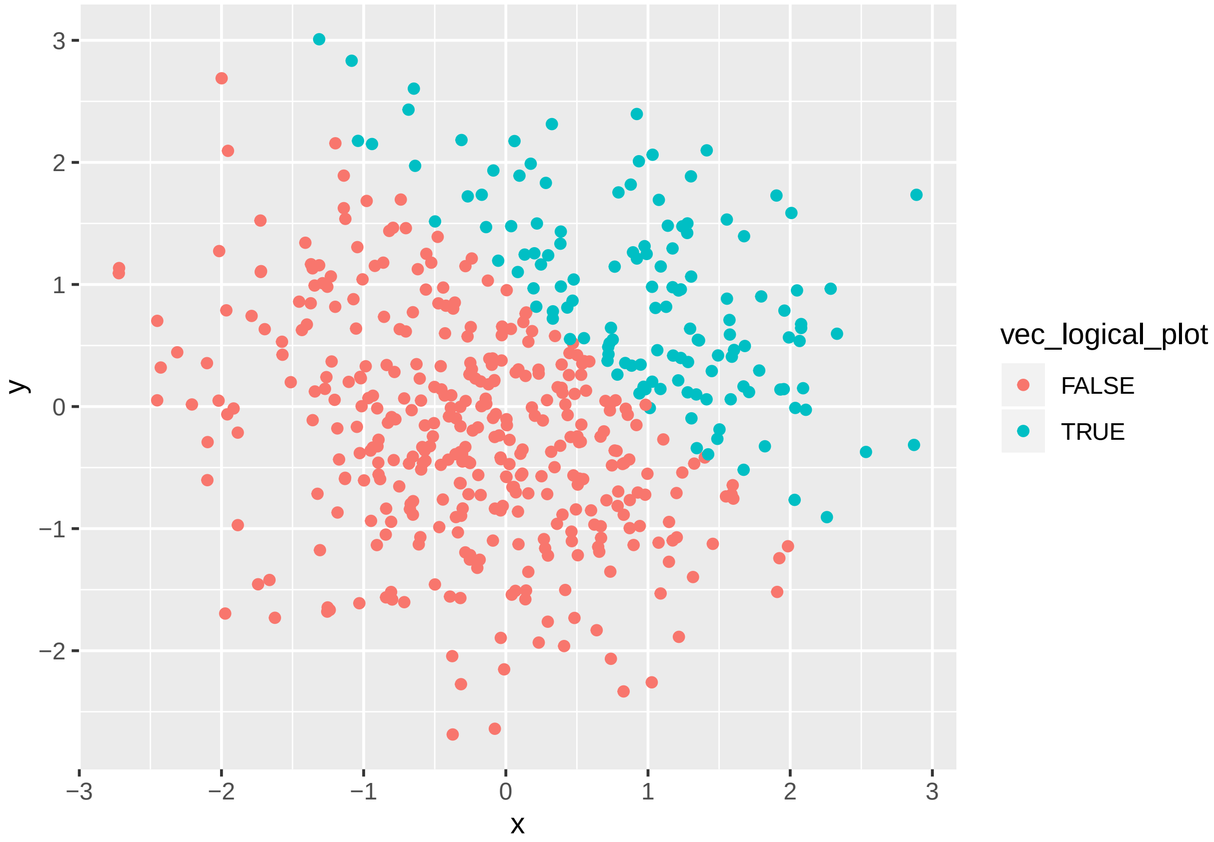
```
## # A tibble: 6 x 5
##         x      y vec_logical_plot vec_fact vec_num
##     <dbl>  <dbl> <lgl>            <fct>      <dbl>
## 1 -0.897  -0.460 FALSE            FALSE          0
## 2  0.185   0.618 FALSE            FALSE          0
## 3  1.59   -0.720 FALSE            FALSE          0
## 4 -1.13   -0.584 FALSE            FALSE          0
## 5 -0.0803  0.216 FALSE            FALSE          0
## 6  0.132   1.24  TRUE             TRUE           1
```

the number of rows in `plot_df` is 500 columns is 5. The mean of x in the dataframe is 0.0616923. The median of the sample is 0.0439172.The standard deviation of the sample is1.0323776 The proportion of x+y>1 is 0.266

create scatterplot

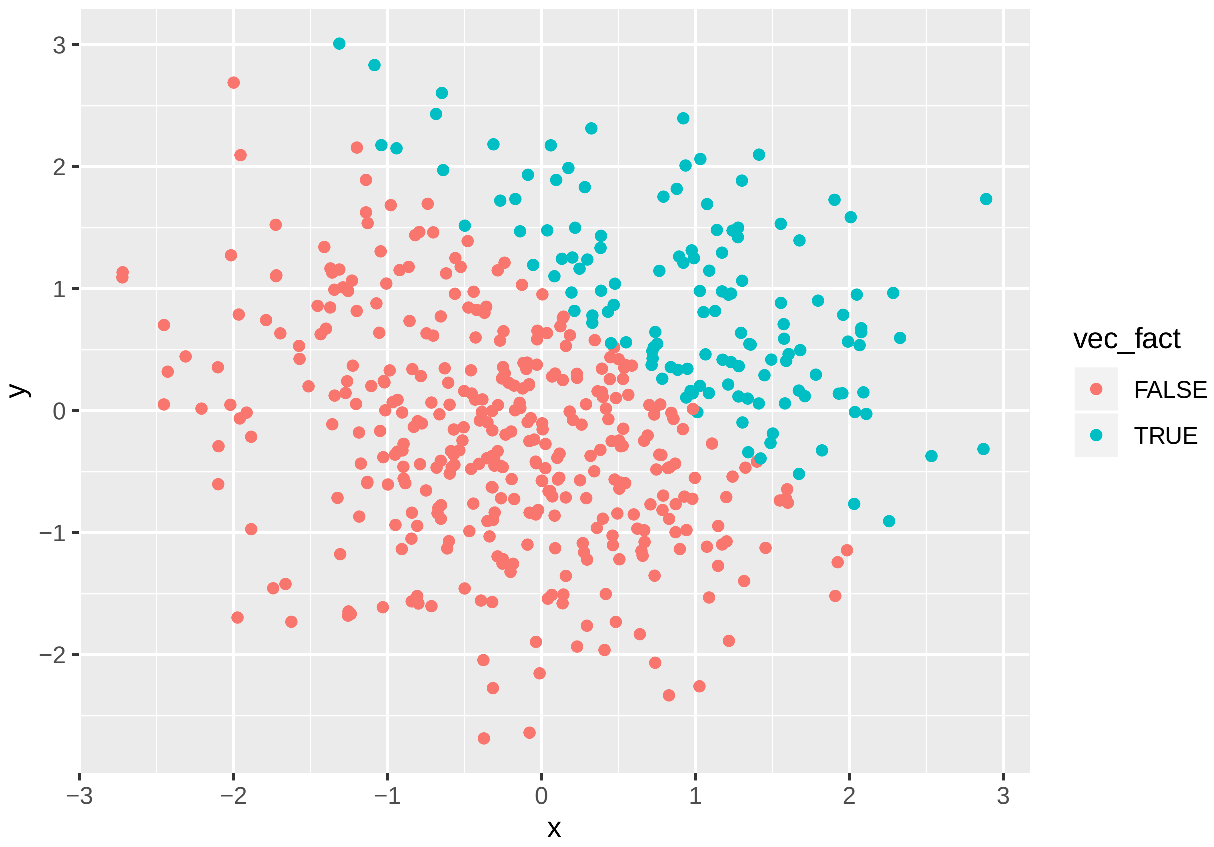
color the logical vairable

```
ggplot(plot_df, aes(x = x, y = y, color=vec_logical_plot)) + geom_point()
```



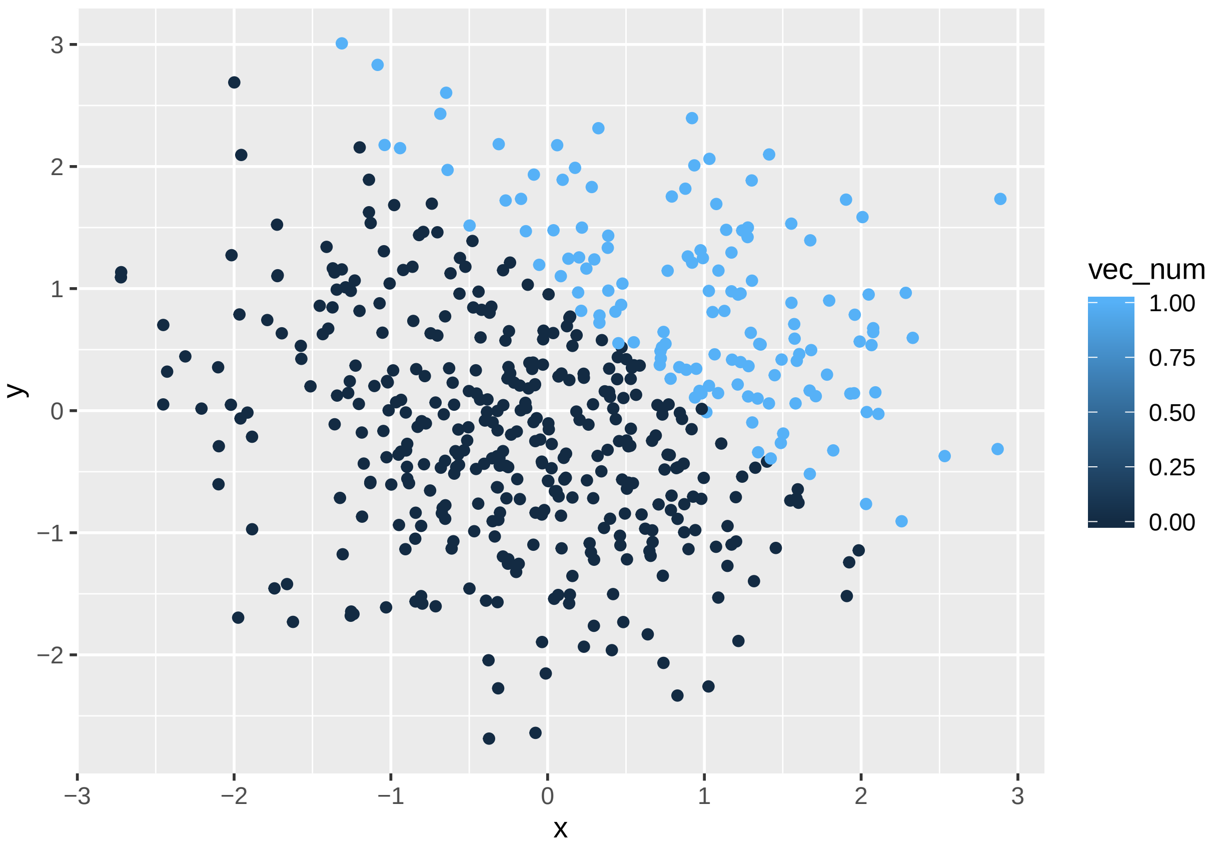
color the factor variable

```
ggplot(plot_df, aes(x = x, y = y, color=vec_fact)) + geom_point()
```



colort the numeric varaible

```
ggplot(plot_df, aes(x = x, y = y, color=vec_num)) + geom_point()
```



export the this scatterplot

```
ggsave("scatter_plot.pdf",height=4,width=6)
```