Analysis Script

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Loading Packages

```
rm(list=ls())
library(ggplot2)
library(tidyverse)
```

Reading dataset

```
df <- read.csv("SampleSuperstore.csv")

str(df)
```

```
## 'data.frame':    9994 obs. of  13 variables:
##  $ Ship.Mode   : Factor w/ 4 levels "First Class",..: 3 3 3 4 4 4 4 4 4 4 ...
##  $ Segment     : Factor w/ 3 levels "Consumer","Corporate",..: 1 1 2 1 1 1 1 1 1 1 ...
##  $ Country     : Factor w/ 1 level "United States": 1 1 1 1 1 1 1 1 1 1 ...
##  $ City        : Factor w/ 531 levels "Aberdeen","Abilene",..: 195 195 267 154 154 267 267 267 267 2
##  $ State       : Factor w/ 49 levels "Alabama","Arizona",..: 16 16 4 9 9 4 4 4 4 4 ...
##  $ Postal.Code : int  42420 42420 90036 33311 33311 90032 90032 90032 90032 90032 ...
##  $ Region      : Factor w/ 4 levels "Central","East",..: 3 3 4 3 3 4 4 4 4 4 ...
##  $ Category    : Factor w/ 3 levels "Furniture","Office Supplies",..: 1 1 2 1 2 1 2 3 2 2 ...
##  $ Sub.Category: Factor w/ 17 levels "Accessories",..: 5 6 11 17 15 10 3 14 4 2 ...
##  $ Sales       : num  262 731.9 14.6 957.6 22.4 ...
##  $ Quantity    : int  2 3 2 5 2 7 4 6 3 5 ...
##  $ Discount    : num  0 0 0 0.45 0.2 0 0 0.2 0.2 0 ...
##  $ Profit      : num  41.91 219.58 6.87 -383.03 2.52 ...
```

```
summary(df)
```

```
##           Ship.Mode            Segment              Country
##  First Class   :1538   Consumer   :5191   United States:9994
##  Same Day      : 543   Corporate  :3020
##  Second Class  :1945   Home Office:1783
##  Standard Class:5968
##
```

```
##
##
##             City                State       Postal.Code        Region
##  New York City: 915   California  :2001   Min.   : 1040   Central:2323
##  Los Angeles  : 747   New York    :1128   1st Qu.:23223   East   :2848
##  Philadelphia : 537   Texas       : 985   Median :56431   South  :1620
##  San Francisco: 510   Pennsylvania: 587   Mean   :55190   West   :3203
##  Seattle      : 428   Washington  : 506   3rd Qu.:90008
##  Houston      : 377   Illinois    : 492   Max.   :99301
##  (Other)      :6480   (Other)     :4295
##             Category         Sub.Category      Sales              Quantity
##  Furniture      :2121   Binders    :1523   Min.   :    0.444   Min.   : 1.00
##  Office Supplies:6026   Paper      :1370   1st Qu.:   17.280   1st Qu.: 2.00
##  Technology     :1847   Furnishings: 957   Median :   54.490   Median : 3.00
##                         Phones     : 889   Mean   :  229.858   Mean   : 3.79
##                         Storage    : 846   3rd Qu.:  209.940   3rd Qu.: 5.00
##                         Art        : 796   Max.   :22638.480   Max.   :14.00
##                         (Other)    :3613
##     Discount          Profit
##  Min.   :0.0000   Min.   :-6599.978
##  1st Qu.:0.0000   1st Qu.:    1.729
##  Median :0.2000   Median :    8.666
##  Mean   :0.1562   Mean   :   28.657
##  3rd Qu.:0.2000   3rd Qu.:   29.364
##  Max.   :0.8000   Max.   : 8399.976
##
```

Data preparation and Cleaning

Checking for abnormalities:

```
#any null values?
is.null(df)
```

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

```
#any duplicacy?
dfnew <- df %>% distinct() ##yes, duplicates were removed
```

We see that there is an outlier in the Sales feature, an unusual hike. Let's replace it with the mean of sales.

```
maxSales <- max(dfnew$Sales)
dfnew$Sales <- replace(dfnew$Sales, dfnew$Sales==maxSales,mean(dfnew$Sales))
```

Removing country and Postal Codes feature

```
dfnew <- dfnew %>% select(-c(Country, Postal.Code))
```

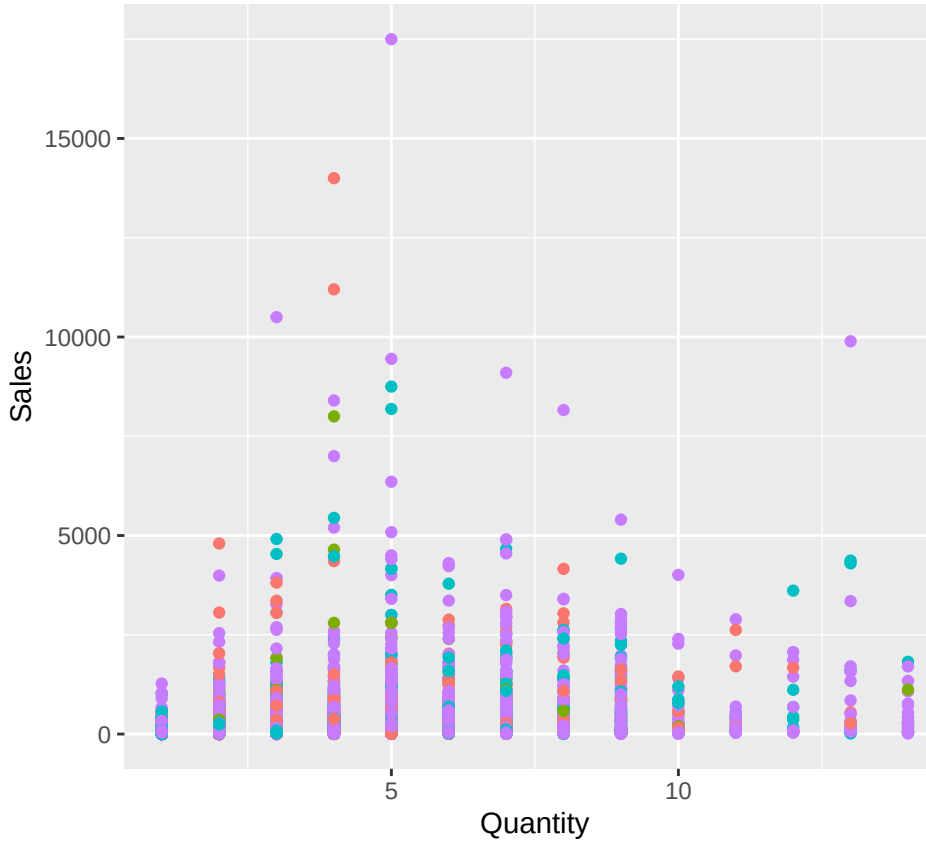
Visualization

Let's analyze patterns in our cleaned data

Sales vs Quantity

```
ggplot() + geom_point(data = dfnew, aes(x = Quantity, y = Sales, color = Ship.Mode))
```

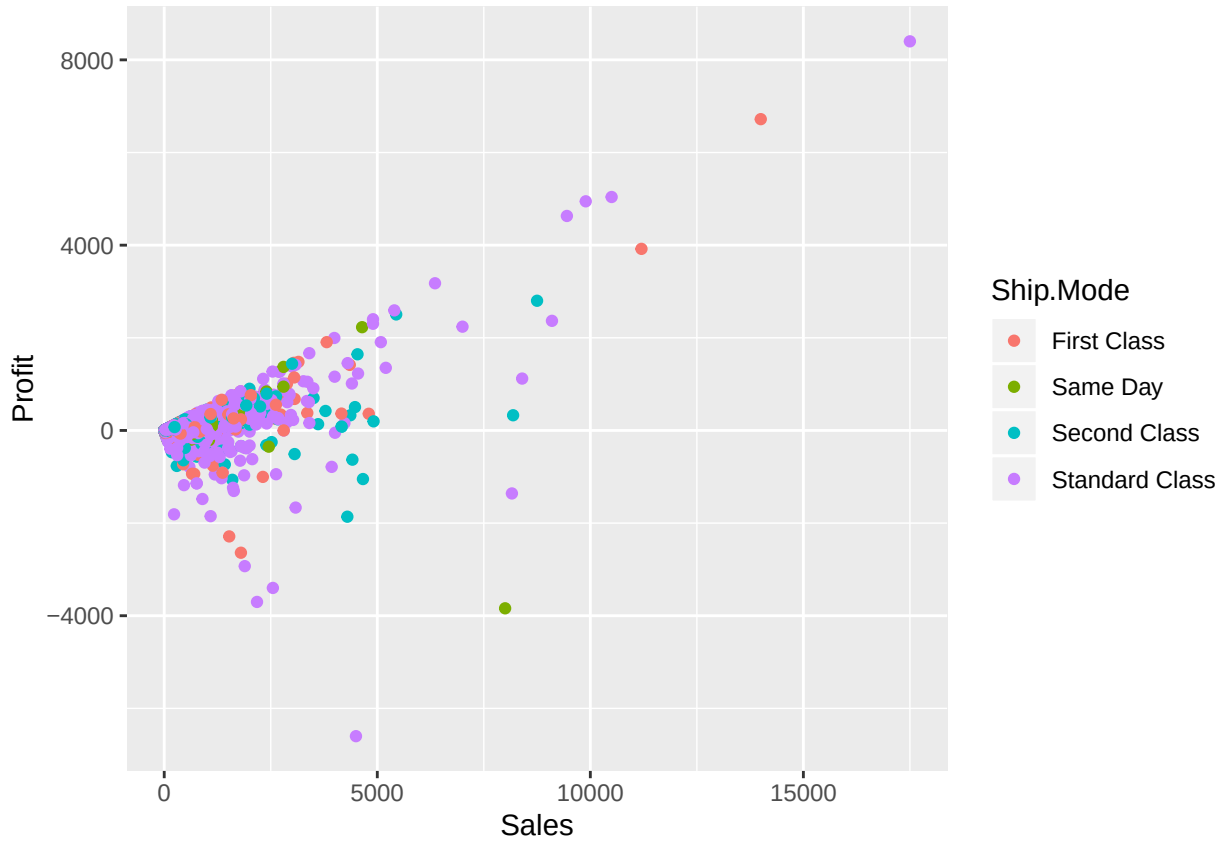
In the below graph, we see the following pattern that most of the sales have been triggered by the standard class of shipment mode.



Sales vs Profit

And hence, obviously we see more profits/loss have been availed from the standard shipment class. But, there are not higher range profits seen this feature.

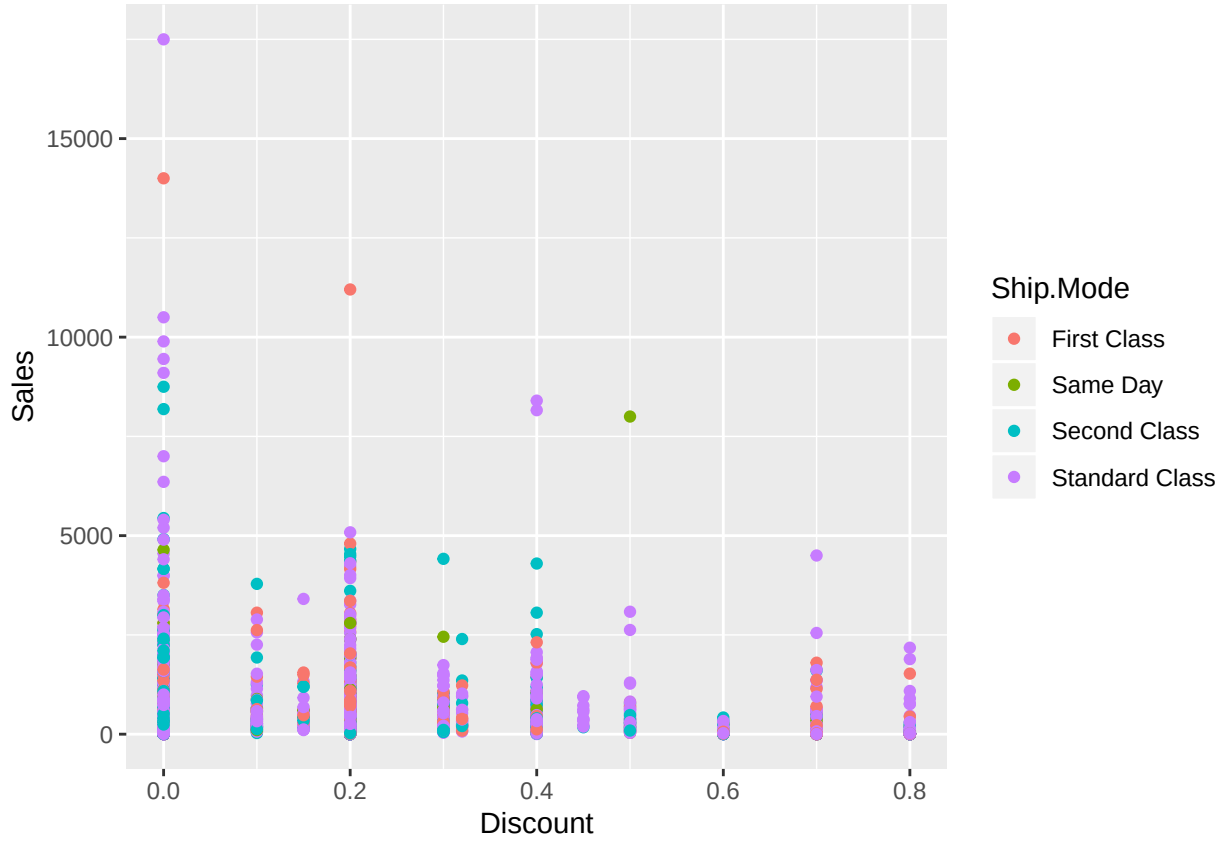
```
ggplot() + geom_point(data = dfnew, aes(x = Sales, y = Profit, color = Ship.Mode))
```



Sales vs Discount

Let us see how Sales are affected if discounts are offered.

```
ggplot() + geom_point(data = dfnew, aes(x = Discount, y = Sales, color = Ship.Mode))
```

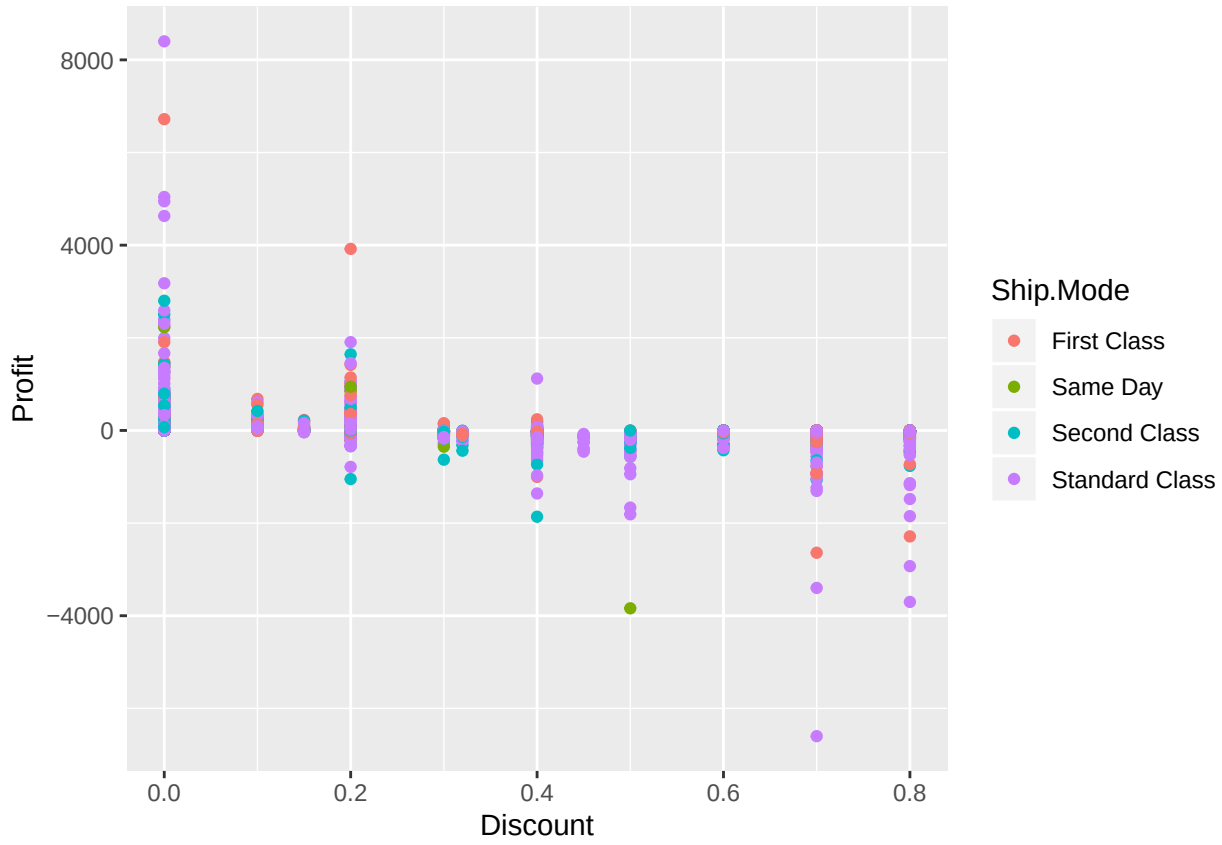


It is evident from the above graph that lesser discounts attract more sales. But, more discounts attract the Standard Class shipment. Same day shipment mode receive the least disount offers.

Profits vs Discount

Let's see if profits have been triggered if discounts have been redeemed.

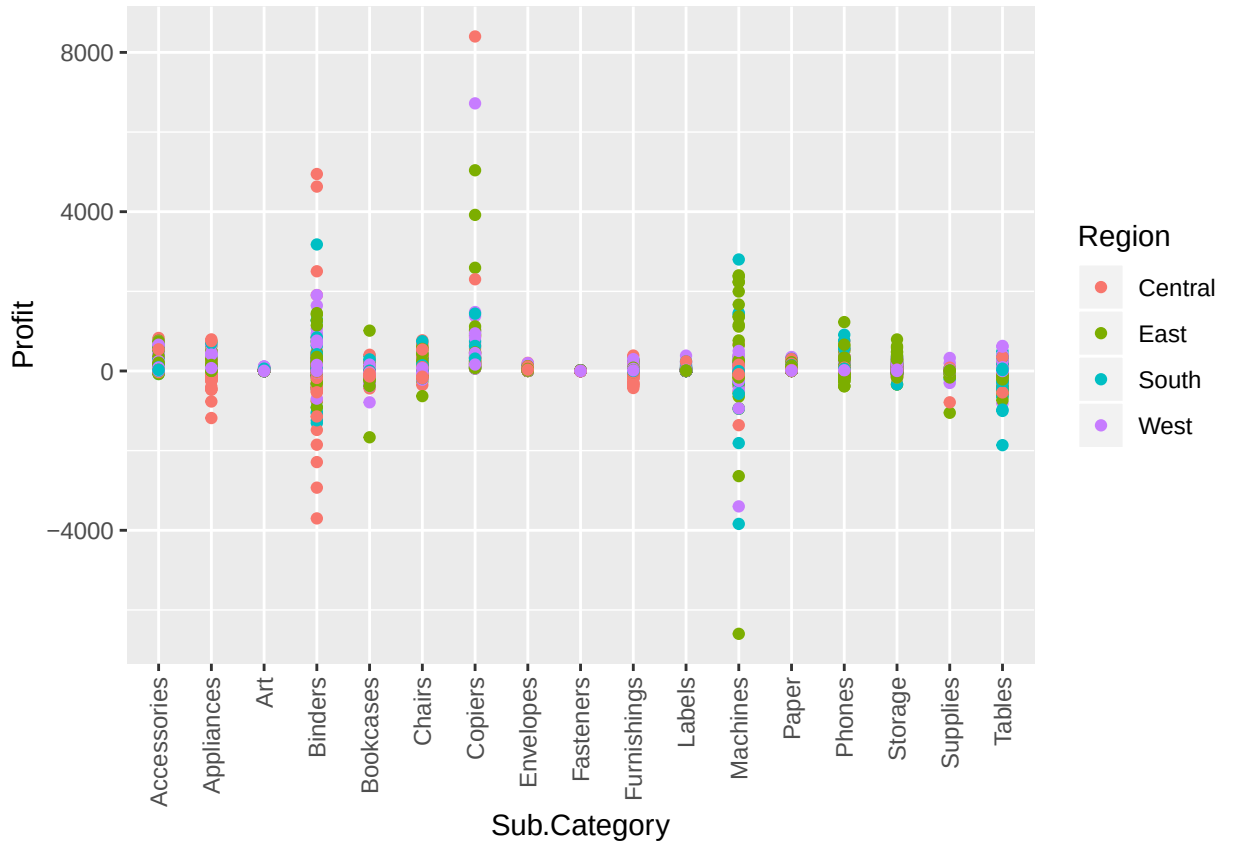
```
ggplot() + geom_point(data = dfnew, aes(x = Discount, y = Profit, color = Ship.Mode))
```



Yes, we see clearly, the more discounts have been offered and redeemed, the lesser profits the segments have achieved. Products with no discounts show high range of profits but as the discount range increases, we only see more and more loss with hardly any profit.

Let us see if this is the case with other segments

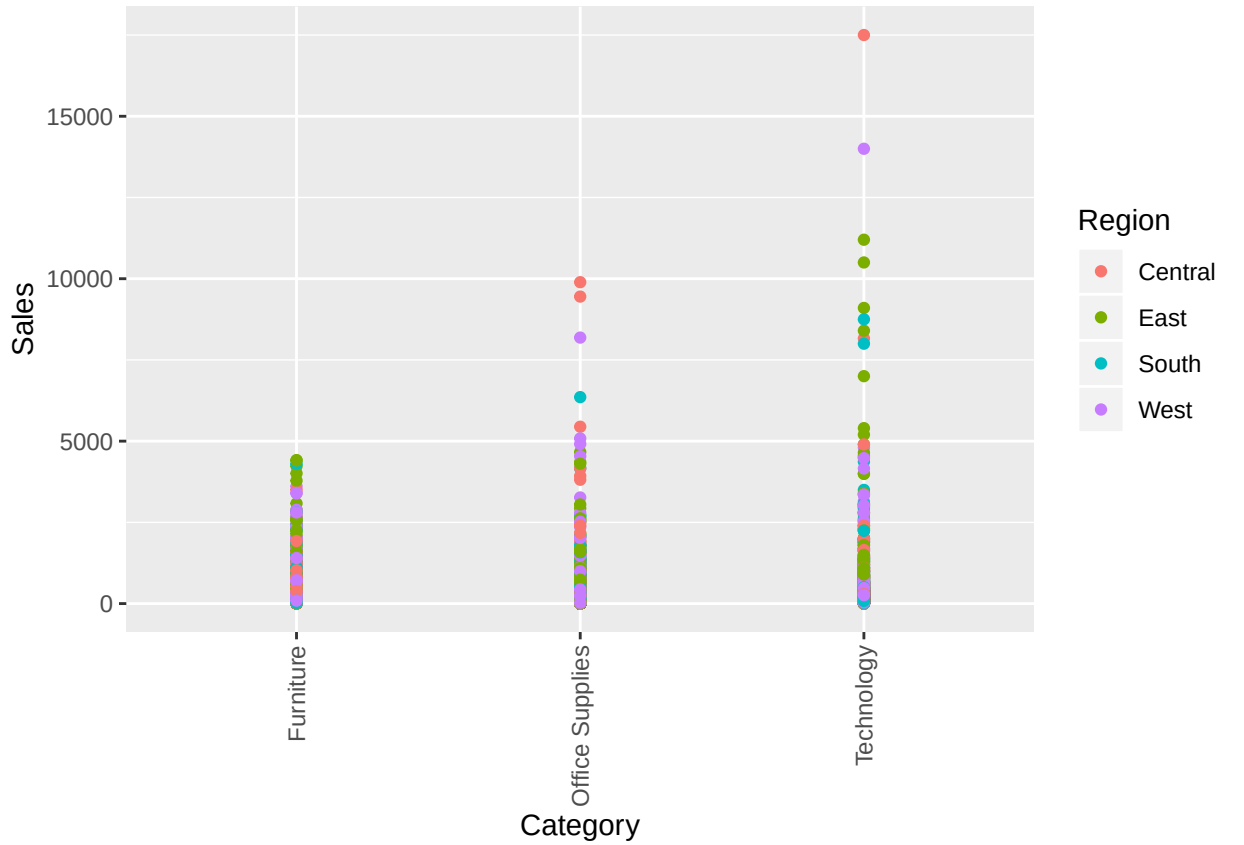
```
ggplot() + geom_point(data = dfnew, aes(x = Sub.Category, y = Profit, color = Region)) + theme(axis.tex
```



We see that more losses have been incurred by the *Binders* industry mainly in the Central region and *Machines* industry.

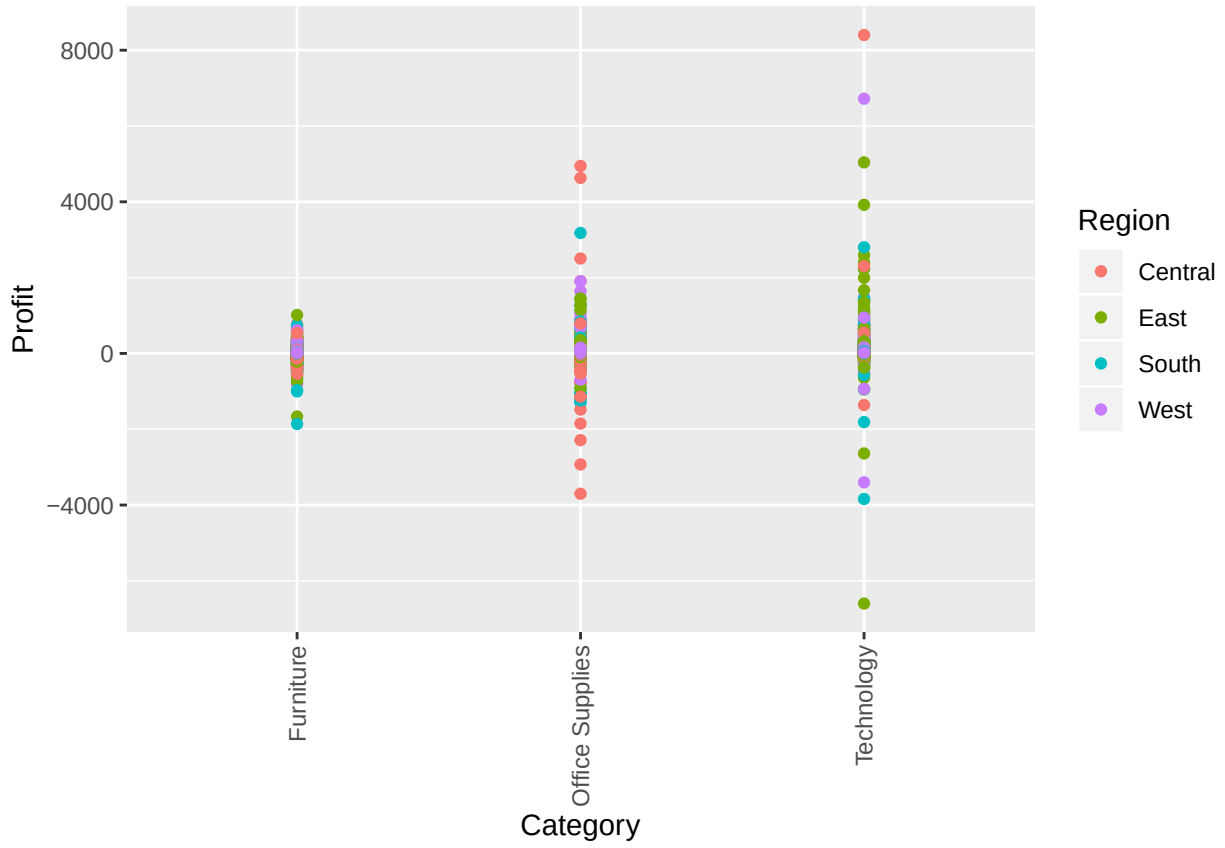
Now,

```
ggplot() + geom_point(data = dfnew, aes(x = Category, y = Sales, color = Region)) + theme(axis.text.x =
```



More Sales have been derived from the technology category, then office supplies and then Furniture.

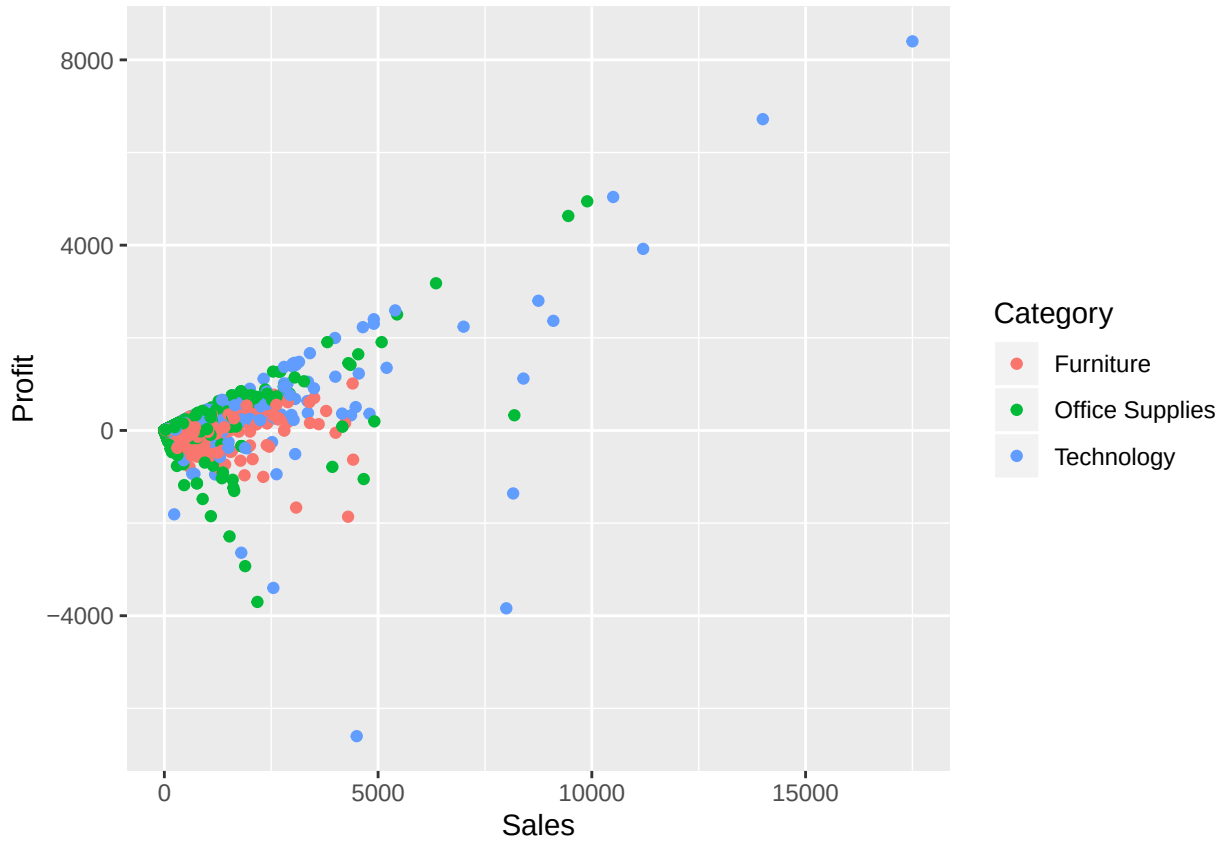
```
ggplot() + geom_point(data = dfnew, aes(x = Category, y = Profit, color = Region)) + theme(axis.text.x =
```



The office supplies category incurrs more loss in the central region, loss in the technology and Furniture category varies by region.

Since, Sales also vary from low to high in this category so is are profits.

```
ggplot() + geom_point(data = dfnew, aes(x = Sales, y = Profit, color = Category))
```



We have now witnessed from the above graphs that the Sales to Profit ratio is same in every category, no matter how they are clubbed.

Conclusion

Recommended Solutions/ Key Insights *Same day shipment if receives more discounts can trigger sales/profits. Discounts should be based on the Sales and should not increase a particular range otherwise unnecessary disounts woth low sales can witness huge losses Binders and Machines industry should be focused upon more so as to strengthen these weakened areas. Office Supplies in the Central Region should be focused upon more to make up losses. Preferred solutions could be discounts/variety or kind of supplies being offered.*

THANK YOU!!