Data Collection and Analysis

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```
# Libraries
library(tidyverse)
```

```
## Warning: package 'tidyverse' was built under R version 4.0.5
```

```
## -- Attaching packages --------------------------------------- tidyverse 1.3.1 --
```

```
## v ggplot2 3.3.3     v purrr   0.3.4
## v tibble  3.1.1     v dplyr   1.0.5
## v tidyr   1.1.3     v stringr 1.4.0
## v readr   1.4.0     v forcats 0.5.1
```

```
## Warning: package 'tibble' was built under R version 4.0.5
```

```
## Warning: package 'tidyr' was built under R version 4.0.5
```

```
## Warning: package 'dplyr' was built under R version 4.0.5
```

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

Two datasets were collected from Kaggle. The first one shows different streaming services, Netflix, Hulu, Amazon Prime Video, and Disney+. The second one shows the number of subscribers for Netflix.

Data Exploration

Let's explore these datasets a little to see what they contain.

```
shows <- read.csv("~/DATA 698/Data Collection and Analysis/Datasets/tv_shows.csv")
summary(shows)
```

```
##        X           Title                Year          Age
##  Min.   :   0   Length:5611        Min.   :1901   Length:5611
##  1st Qu.:1402   Class :character   1st Qu.:2010   Class :character
##  Median :2805   Mode  :character   Median :2015   Mode  :character
##  Mean   :2805                      Mean   :2011
```

```
##  3rd Qu.:4208                    3rd Qu.:2017
##  Max.   :5610                    Max.   :2020
##
##       IMDb       Rotten.Tomatoes       Netflix            Hulu
##  Min.   :1.000   Length:5611        Min.   :0.0000   Min.   :0.0000
##  1st Qu.:6.600   Class :character   1st Qu.:0.0000   1st Qu.:0.0000
##  Median :7.300   Mode  :character   Median :0.0000   Median :0.0000
##  Mean   :7.113                      Mean   :0.3441   Mean   :0.3126
##  3rd Qu.:7.900                      3rd Qu.:1.0000   3rd Qu.:1.0000
##  Max.   :9.600                      Max.   :1.0000   Max.   :1.0000
##  NA's   :1161
##   Prime.Video        Disney.             type
##  Min.   :0.0000   Min.   :0.00000   Min.   :1
##  1st Qu.:0.0000   1st Qu.:0.00000   1st Qu.:1
##  Median :0.0000   Median :0.00000   Median :1
##  Mean   :0.3821   Mean   :0.03208   Mean   :1
##  3rd Qu.:1.0000   3rd Qu.:0.00000   3rd Qu.:1
##  Max.   :1.0000   Max.   :1.00000   Max.   :1
##
```

```
head(shows, 50)
```

```
##     X                           Title Year Age IMDb Rotten.Tomatoes Netflix
## 1   0                  Breaking Bad 2008 18+  9.5             96%       1
## 2   1                Stranger Things 2016 16+  8.8             93%       1
## 3   2                    Money Heist 2017 18+  8.4             91%       1
## 4   3                       Sherlock 2010 16+  9.1             78%       1
## 5   4              Better Call Saul 2015 18+  8.7             97%       1
## 6   5                    The Office 2005 16+  8.9             81%       1
## 7   6                  Black Mirror 2011 18+  8.8             83%       1
## 8   7                  Supernatural 2005 16+  8.4             93%       1
## 9   8                 Peaky Blinders 2013 18+  8.8             92%       1
## 10  9       Avatar: The Last Airbender 2005  7+  9.2            100%       1
## 11 10              The Walking Dead 2010 18+  8.2             81%       1
## 12 11                          Dark 2017 16+  8.7             94%       1
## 13 12                         Ozark 2017 18+  8.4             81%       1
## 14 13              Attack on Titan 2013 16+  8.8             94%       1
## 15 14                       Narcos 2015 18+  8.8             89%       1
## 16 15 Fullmetal Alchemist: Brotherhood 2009 18+  9.1            100%       1
## 17 16                    Community 2009  7+  8.5             88%       1
## 18 17                   Mindhunter 2017 18+  8.6             96%       1
## 19 18         Parks and Recreation 2009 16+  8.6             93%       1
## 20 19                       Dexter 2006 18+  8.6             72%       1
## 21 20           Marvel's Daredevil 2015 18+  8.6             92%       1
## 22 21                  The Witcher 2019 18+  8.3             67%       1
## 23 22                    Twin Peaks 1990 18+  8.8             89%       1
## 24 23                 One-Punch Man 2015 16+  8.8            100%       1
## 25 24                     Outlander 2014 18+  8.4             91%       1
## 26 25                House of Cards 2013 18+  8.7             78%       1
## 27 26                     Shameless 2011 18+  8.6             85%       1
## 28 27                The Good Place 2016 16+  8.2             97%       1
## 29 28                  The Haunting 2018 18+  8.7             93%       1
## 30 29                 The Blacklist 2013 16+  8.0             91%       1
## 31 30                     The Flash 2014  7+  7.7             89%       1
```

```
## 32 31                 The Last Kingdom 2015 18+  8.4            91%       1
## 33 32                         Mad Men 2007 16+  8.6            94%       1
## 34 33                         Lucifer 2016 16+  8.2            87%       1
## 35 34          Orange Is the New Black 2013 18+  8.1            90%       1
## 36 35                   Grey's Anatomy 2005 16+  7.6            83%       1
## 37 36     The End of the F***ing World 2017 18+  8.1            93%       1
## 38 37             Arrested Development 2003 16+  8.7            75%       1
## 39 38              The Vampire Diaries 2009  7+  7.7            85%       1
## 40 39                       The Crown 2016 18+  8.7            89%       1
## 41 40                         The 100 2014 16+  7.7            92%       1
## 42 41                When They See Us 2019 18+  8.9            96%       1
## 43 42      How to Get Away with Murder 2014 16+  8.1            88%       1
## 44 43                      After Life 2019 18+  8.5            70%       1
## 45 44                           Elite 2018 18+  7.6            97%       1
## 46 45                 BoJack Horseman 2014 18+  8.7            93%       1
## 47 46               Never Have I Ever 2020 16+  8.0            97%       1
## 48 47                  Penny Dreadful 2014 18+  8.2            91%       1
## 49 48  Marvel's Agents of S.H.I.E.L.D. 2013 16+  7.5            94%       1
## 50 49                      Dead to Me 2019 18+  8.1            91%       1
##    Hulu Prime.Video Disney. type
## 1     0           0       0    1
## 2     0           0       0    1
## 3     0           0       0    1
## 4     0           0       0    1
## 5     0           0       0    1
## 6     0           0       0    1
## 7     0           0       0    1
## 8     0           0       0    1
## 9     0           0       0    1
## 10    0           0       0    1
## 11    0           0       0    1
## 12    0           0       0    1
## 13    0           0       0    1
## 14    1           0       0    1
## 15    0           0       0    1
## 16    1           0       0    1
## 17    1           0       0    1
## 18    0           0       0    1
## 19    1           1       0    1
## 20    0           0       0    1
## 21    0           0       0    1
## 22    0           0       0    1
## 23    1           0       0    1
## 24    1           0       0    1
## 25    0           0       0    1
## 26    0           0       0    1
## 27    0           0       0    1
## 28    1           0       0    1
## 29    0           0       0    1
## 30    0           0       0    1
## 31    0           0       0    1
## 32    0           0       0    1
## 33    0           0       0    1
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```

```
## 35    0           0       0    1
## 36    1           0       0    1
## 37    0           0       0    1
## 38    1           0       0    1
## 39    0           0       0    1
## 40    0           0       0    1
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## 43    1           0       0    1
## 44    0           0       0    1
## 45    0           0       0    1
## 46    0           0       0    1
## 47    0           0       0    1
## 48    0           0       0    1
## 49    0           0       0    1
## 50    0           0       0    1
```

The first dataset has each observation as a different TV show, there are 5611 different observation. Each of them is shown the year the show came out, the IMDb and Rotten Tomatoes rating, and whether the show is in the specified streaming service. A value of 1 means that the show is included in the streaming service and a value of 0 means that the show is not in the streaming service.

```
Netflix_subs <- read.csv("~/DATA 698/Data Collection and Analysis/Datasets/DataNetflixSubscriber2020_V2
head(Netflix_subs, 40)
```

```
##                                Area     Years Subscribers
## 1         United States and Canada Q1 - 2018    60909000
## 2  Europe,  Middle East and Africa Q1 - 2018    29339000
## 3                    Latin America Q1 - 2018    21260000
## 4                     Asia-Pacific Q1 - 2018     7394000
## 5         United States and Canada Q2 - 2018    61870000
## 6  Europe,  Middle East and Africa Q2 - 2018    31317000
## 7                    Latin America Q2 - 2018    22795000
## 8                     Asia-Pacific Q2 - 2018     8372000
## 9         United States and Canada Q3 - 2018    63010000
## 10 Europe,  Middle East and Africa Q3 - 2018    33836000
## 11                   Latin America Q3 - 2018    24115000
## 12                    Asia-Pacific Q3 - 2018     9461000
## 13        United States and Canada Q4 - 2018    64757000
## 14 Europe,  Middle East and Africa Q4 - 2018    37818000
## 15                   Latin America Q4 - 2018    26077000
## 16                    Asia-Pacific Q4 - 2018    10607000
## 17        United States and Canada Q1 - 2019    66633000
## 18 Europe,  Middle East and Africa Q1 - 2019    42542000
## 19                   Latin America Q1 - 2019    27547000
## 20                    Asia-Pacific Q1 - 2019    12141000
## 21        United States and Canada Q2 - 2019    66501000
## 22 Europe,  Middle East and Africa Q2 - 2019    44229000
## 23                   Latin America Q2 - 2019    27890000
## 24                    Asia-Pacific Q2 - 2019    12942000
## 25        United States and Canada Q3 - 2019    67114000
## 26 Europe,  Middle East and Africa Q3 - 2019    47355000
## 27                   Latin America Q3 - 2019    29380000
```

```
## 28                    Asia-Pacific Q3 - 2019    14485000
## 29        United States and Canada Q4 - 2019    67662000
## 30 Europe,  Middle East and Africa Q4 - 2019    51778000
## 31                   Latin America Q4 - 2019    31417000
## 32                    Asia-Pacific Q4 - 2019    16233000
## 33        United States and Canada Q1 - 2020    69969000
## 34 Europe,  Middle East and Africa Q1 - 2020    58734000
## 35                   Latin America Q1 - 2020    34318000
## 36                    Asia-Pacific Q1 - 2020    19835000
## 37        United States and Canada Q2 - 2020    72904000
## 38 Europe,  Middle East and Africa Q2 - 2020    61483000
## 39                   Latin America Q2 - 2020    36068000
## 40                    Asia-Pacific Q2 - 2020    22492000
```

The second dataset has each observation as a certain area for each quarter from the year 2018 to 2020. There are 40 observations showing 4 quarters for the year 2018 and 2019, and the first two quarters for the year 2020. The number of subscribers are shown for each area by the quarter of that year.

Data Analysis

```
Netflix <- shows %>%
  select(Title, Year, Age, IMDb, Rotten.Tomatoes, Netflix) %>%
  filter(Netflix == 1) %>%
  group_by(Title)
Netflix
```

```
## # A tibble: 1,931 x 6
## # Groups:   Title [1,925]
##    Title                       Year Age    IMDb Rotten.Tomatoes Netflix
##    <chr>                      <int> <chr> <dbl> <chr>              <int>
##  1 Breaking Bad                2008 18+     9.5 96%                    1
##  2 Stranger Things             2016 16+     8.8 93%                    1
##  3 Money Heist                 2017 18+     8.4 91%                    1
##  4 Sherlock                    2010 16+     9.1 78%                    1
##  5 Better Call Saul            2015 18+     8.7 97%                    1
##  6 The Office                  2005 16+     8.9 81%                    1
##  7 Black Mirror                2011 18+     8.8 83%                    1
##  8 Supernatural                2005 16+     8.4 93%                    1
##  9 Peaky Blinders              2013 18+     8.8 92%                    1
## 10 Avatar: The Last Airbender  2005 7+      9.2 100%                   1
## # ... with 1,921 more rows
```

```
Hulu <- shows %>%
  select(Title, Year, Age, IMDb, Rotten.Tomatoes, Hulu) %>%
  filter(Hulu == 1) %>%
  group_by(Title)
Hulu
```

```
## # A tibble: 1,754 x 6
## # Groups:   Title [1,739]
```

```
##    Title                              Year Age    IMDb Rotten.Tomatoes  Hulu
##    <chr>                             <int> <chr> <dbl> <chr>           <int>
##  1 Attack on Titan                    2013 16+     8.8 94%                 1
##  2 Fullmetal Alchemist: Brotherhood   2009 18+     9.1 100%                1
##  3 Community                          2009 7+      8.5 88%                 1
##  4 Parks and Recreation               2009 16+     8.6 93%                 1
##  5 Twin Peaks                         1990 18+     8.8 89%                 1
##  6 One-Punch Man                      2015 16+     8.8 100%                1
##  7 The Good Place                     2016 16+     8.2 97%                 1
##  8 Grey's Anatomy                     2005 16+     7.6 83%                 1
##  9 Arrested Development               2003 16+     8.7 75%                 1
## 10 How to Get Away with Murder        2014 16+     8.1 88%                 1
## # ... with 1,744 more rows
```

```
Prime_video <- shows %>%
  select(Title, Year, Age, IMDb, Rotten.Tomatoes, Prime.Video) %>%
  filter(Prime.Video == 1) %>%
  group_by(Title)
Prime_video
```

```
## # A tibble: 2,144 x 6
## # Groups:   Title [2,138]
##    Title                              Year Age    IMDb Rotten.Tomatoes Prime.Video
##    <chr>                             <int> <chr> <dbl> <chr>                <int>
##  1 Parks and Recreation               2009 16+     8.6 "93%"                    1
##  2 Star Trek: The Next Generation     1987 7+      8.6 "89%"                    1
##  3 The Good Wife                      2009 16+     8.3 "94%"                    1
##  4 Schitt's Creek                     2015 16+     8.4 "50%"                    1
##  5 Burn Notice                        2007 7+      7.9 "88%"                    1
##  6 American Horror Story              2011 18+     8   ""                       1
##  7 Star Trek                          1966 7+      8.3 "80%"                    1
##  8 Mushi-Shi                          2005 16+     8.5 "100%"                   1
##  9 Star Trek: Deep Space Nine         1993 7+      7.9 "90%"                    1
## 10 Law & Order: Special Victims U~    1999 16+     8   ""                       1
## # ... with 2,134 more rows
```

```
Disney_plus <- shows %>%
  select(Title, Year, Age, IMDb, Rotten.Tomatoes, Disney.) %>%
  filter(Disney. == 1) %>%
  group_by(Title)
Disney_plus
```

```
## # A tibble: 180 x 6
## # Groups:   Title [179]
##    Title                            Year Age    IMDb Rotten.Tomatoes Disney.
##    <chr>                           <int> <chr> <dbl> <chr>             <int>
##  1 Lab Rats                         2012 7+      6.6 ""                    1
##  2 America's Funniest Home Videos   1989 7+      6.2 ""                    1
##  3 Brain Games                      2011 7+      8.3 ""                    1
##  4 Jessie                           2011 all     5.9 ""                    1
##  5 PJ Masks                         2015 all     5.6 ""                    1
##  6 Best Friends Whenever            2015 all     5.5 ""                    1
##  7 The Simpsons                     1989 7+      8.7 "85%"                 1
```

```
##  8 Gravity Falls                   2012 7+      8.9 "100%"               1
##  9 Marvel's Runaways               2017 16+     7   "87%"                1
## 10 Star vs. the Forces of Evil     2015 7+      8   ""                   1
## # ... with 170 more rows
```

From sorting the data we see what shows are available for each streaming services, Netflix, Hulu, Prime video, and Disney+. We see that Prime Video contains more shows than the other streaming services while Disney+ contains the least amount. From the data we can see that Netflix contains more shows that have higher ratings. This is based on the IMDb and Rotten Tomatoes scores.

```
ggplot(Netflix, aes(x = Title, y = IMDb)) + geom_point()
```

```
## Warning: Removed 120 rows containing missing values (geom_point).

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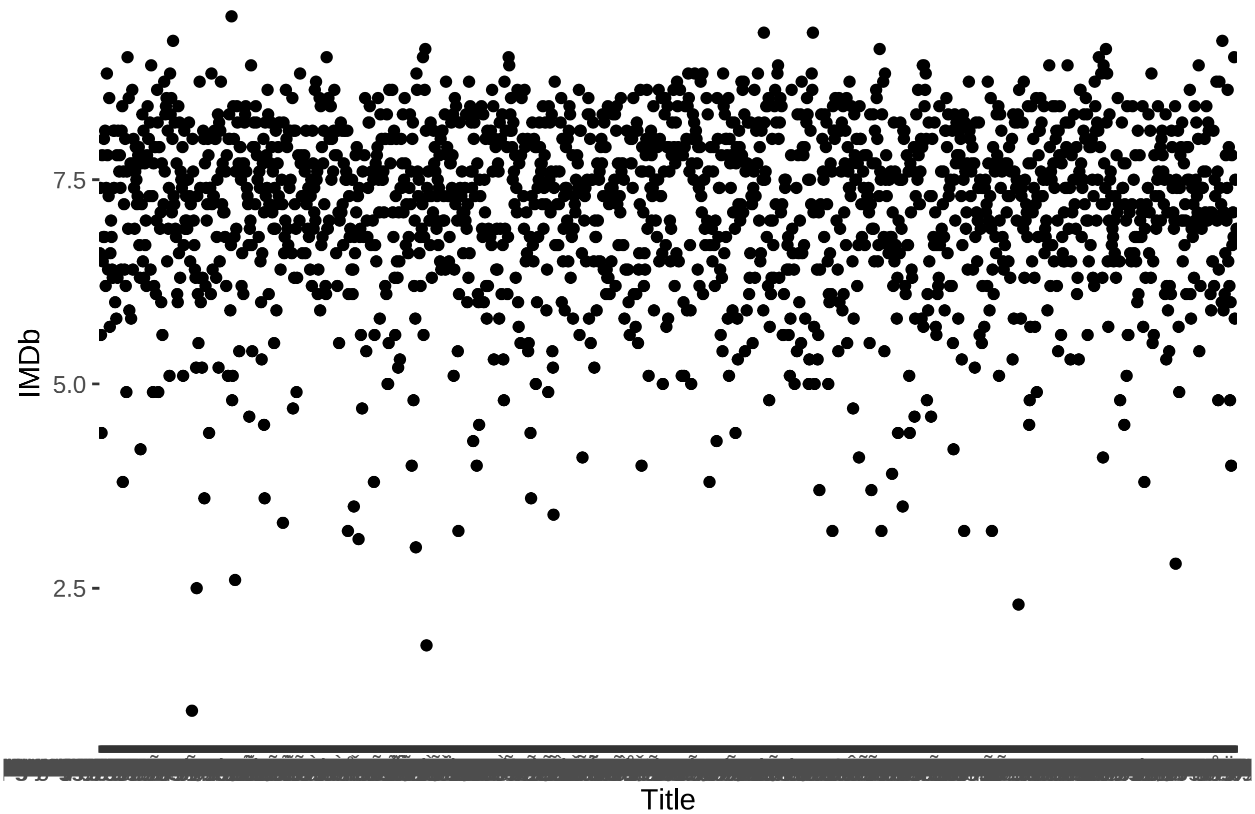


```r
ggplot(Hulu, aes(x = Title, y = IMDb)) + geom_point()
```

```
## Warning: Removed 237 rows containing missing values (geom_point).

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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
## width unknown for character 0x81

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
## width unknown for character 0x81
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
## width unknown for character 0x81
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## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
## width unknown for character 0x81

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
## font width unknown for character 0x81

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
## font width unknown for character 0x81
```

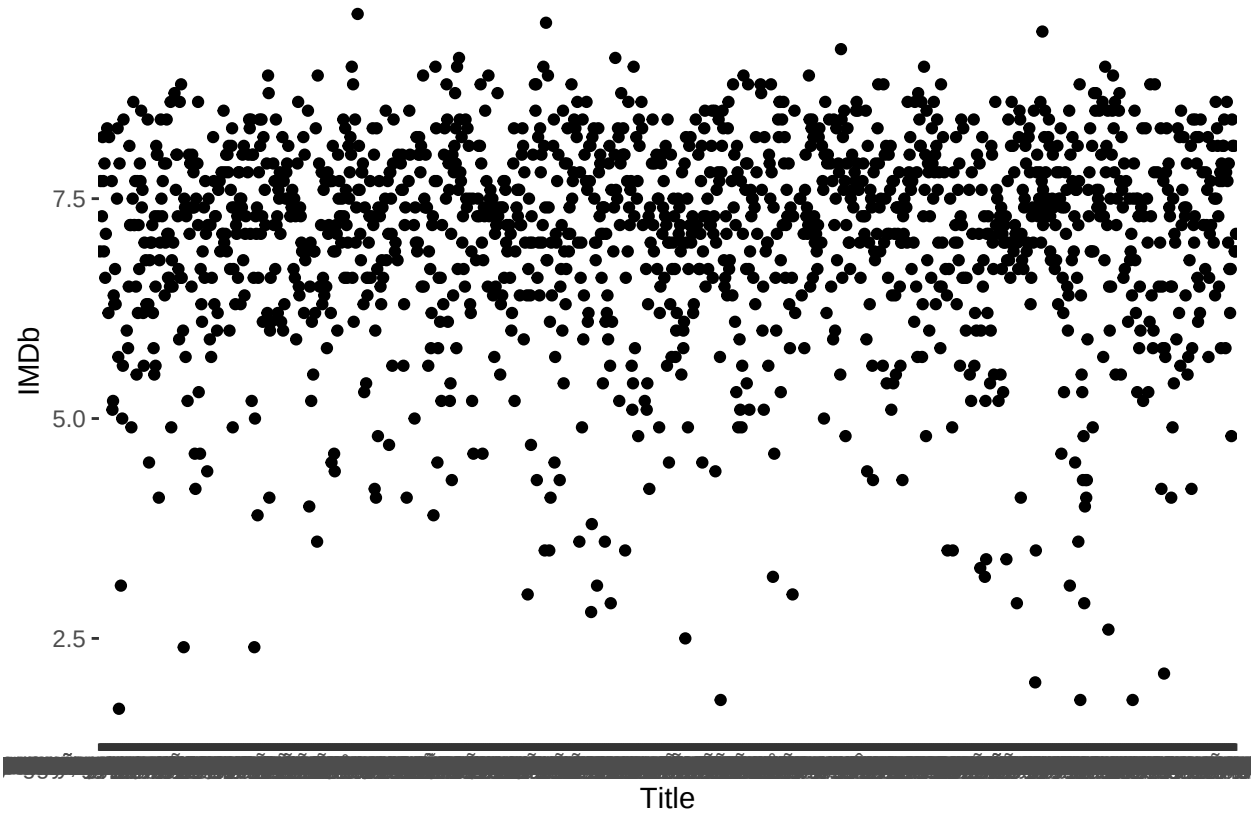


```
ggplot(Prime_video, aes(x = Title, y = IMDb)) + geom_point()
```

```
## Warning: Removed 837 rows containing missing values (geom_point).

## Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, : font
## width unknown for character 0x90

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## width unknown for character 0x90

## Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
## font width unknown for character 0x90

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```
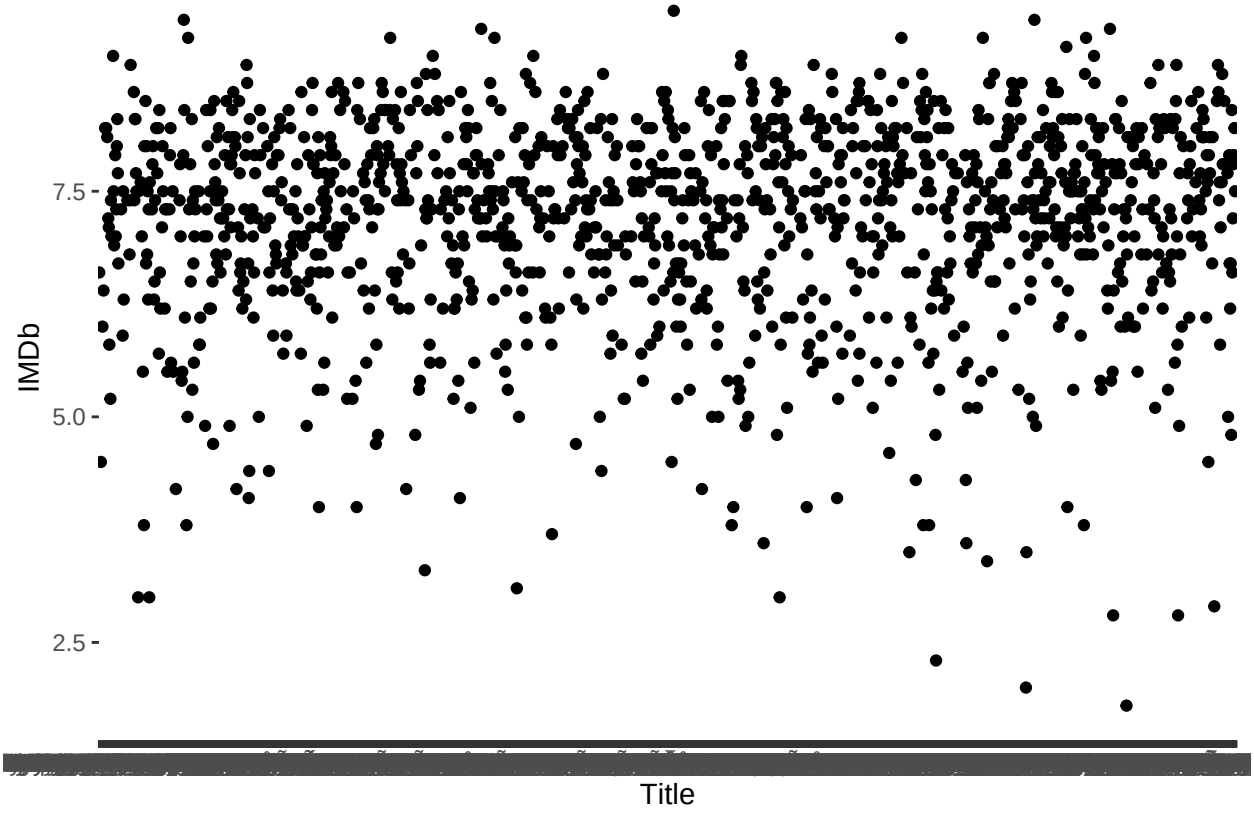
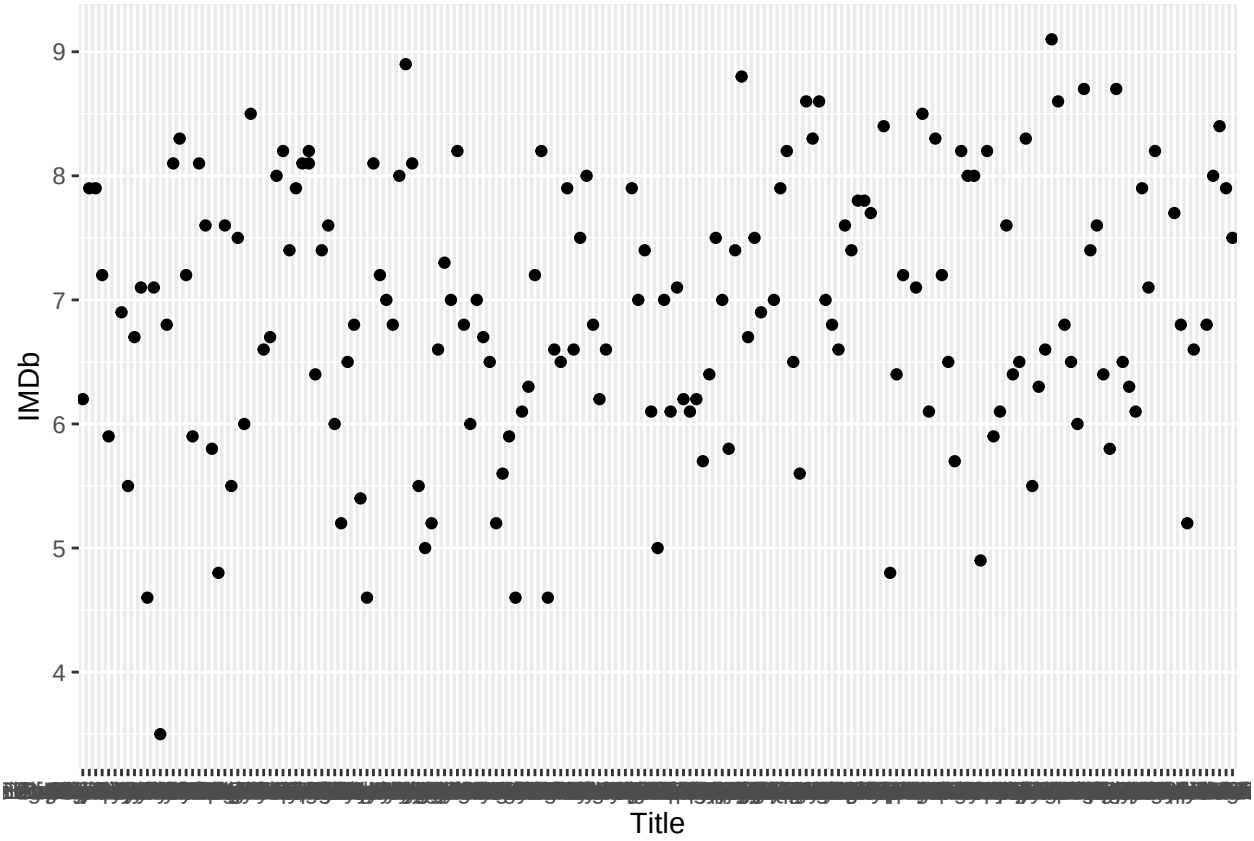




```
ggplot(Disney_plus, aes(x = Title, y = IMDb)) + geom_point()
```

```
## Warning: Removed 11 rows containing missing values (geom_point).
```



Since Netflix and Amazon Prime Video seem to be two of the biggest streaming services let us look into the number of people who have subscribed to these services over the years. This will give us an insight on whether people are using these services and how much they have grown. I will be using data I found on Netflix subscriptions to show this.

For the second dataset since the data is split by different regions and shows the number of subscribers from the year 2018 to the first half of 2020 a shiny app was created to visualize the data. For this visualization a shiny app was created. It can be viewed here: