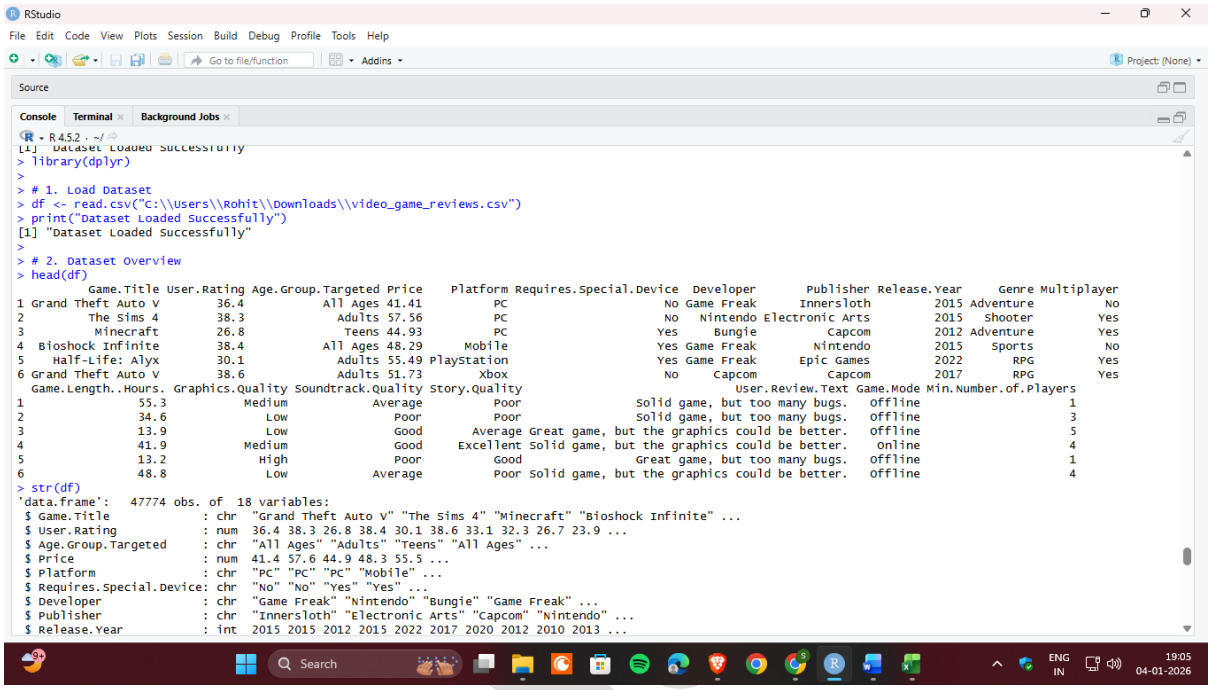
SHETH L.U.J AND SIR M.V. COLLEGE

SUBJECT :- R PROGRAMMING

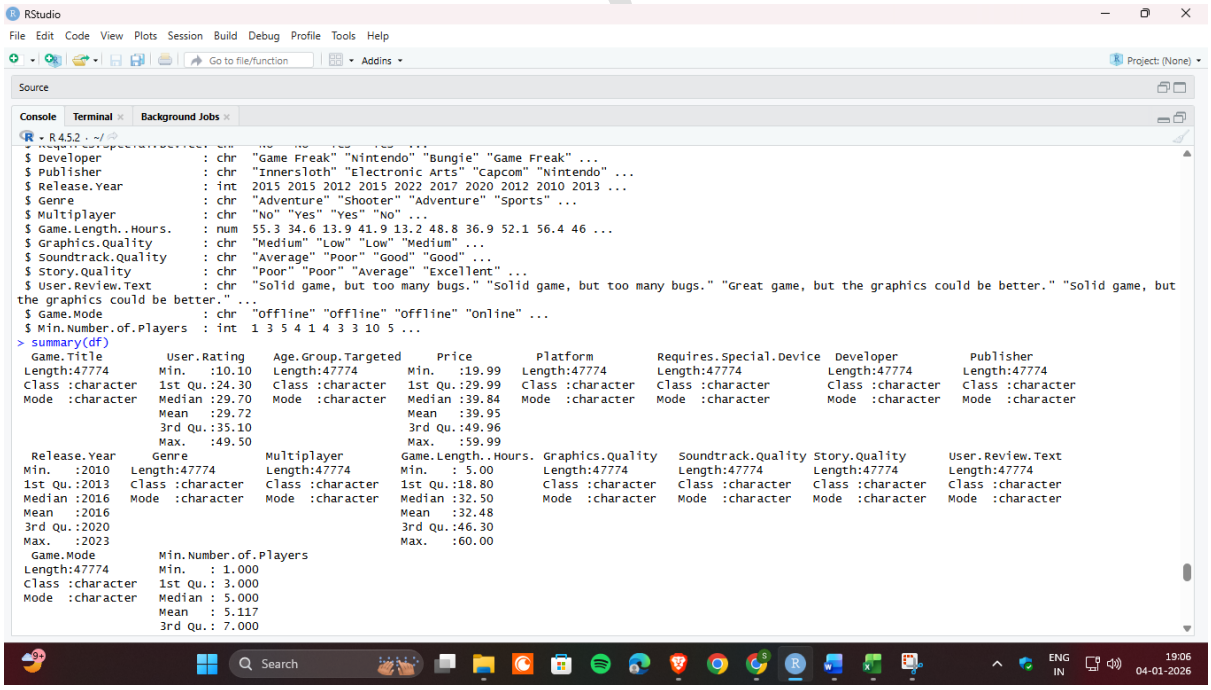
MODULE 2 – PRACTICAL 8

AIM: Performing two-way ANOVA using aov() (R).

OUTPUT:-



```
> library(dplyr)
>
> # 1. Load Dataset
> df <- read.csv("C:\\Users\\Rohit\\Downloads\\video_game_reviews.csv")
> print("Dataset Loaded Successfully")
[1] "Dataset Loaded Successfully"
>
> # 2. Dataset Overview
> head(df)
          Game.Title User.Rating Age.Group.Targeted Price    Platform Requires.Special.Device  Developer       Publisher Release.Year     Genre Multiplayer
1 Grand Theft Auto V         36.4            All Ages 41.41          PC                     No Game Freak      Innersloth         2015 Adventure          No
2          The Sims 4         38.3              Adults 57.56          PC                     No   Nintendo Electronic Arts         2015   Shooter         Yes
3           Minecraft         26.8               Teens 44.93          PC                    Yes      Bungie          Capcom         2012 Adventure         Yes
4  Bioshock Infinite          38.4            All Ages 48.29      Mobile                    Yes Game Freak        Nintendo         2015    Sports          No
5     Half-Life: Alyx         30.1              Adults 55.49 PlayStation                    Yes Game Freak      Epic Games         2022       RPG         Yes
6 Grand Theft Auto V          38.6              Adults 51.73        Xbox                     No     Capcom         Capcom         2017       RPG         Yes
  Game.Length..Hours. Graphics.Quality Soundtrack.Quality Story.Quality                                User.Review.Text Game.Mode Min.Number.of.Players
1                55.3            Medium            Average          Poor                Solid game, but too many bugs.   Offline                     1
2                34.6               Low               Poor          Poor                Solid game, but too many bugs.   Offline                     3
3                13.9               Low               Good       Average Great game, but the graphics could be better.   Offline                     5
4                41.9            Medium               Good     Excellent Solid game, but the graphics could be better.    Online                     4
5                13.2              High               Poor          Good              Great game, but too many bugs.   Offline                     1
6                48.8               Low            Average          Poor Solid game, but the graphics could be better.   Offline                     4
> str(df)
'data.frame':   47774 obs. of  18 variables:
 $ Game.Title             : chr  "Grand Theft Auto V" "The Sims 4" "Minecraft" "Bioshock Infinite" ...
 $ User.Rating            : num  36.4 38.3 26.8 38.4 30.1 38.6 33.1 32.3 26.7 23.9 ...
 $ Age.Group.Targeted     : chr  "All Ages" "Adults" "Teens" "All Ages" ...
 $ Price                  : num  41.4 57.6 44.9 48.3 55.5 ...
 $ Platform               : chr  "PC" "PC" "PC" "Mobile" ...
 $ Requires.Special.Device: chr  "No" "No" "Yes" "Yes" ...
 $ Developer              : chr  "Game Freak" "Nintendo" "Bungie" "Game Freak" ...
 $ Publisher              : chr  "Innersloth" "Electronic Arts" "Capcom" "Nintendo" ...
 $ Release.Year           : int  2015 2015 2012 2015 2022 2017 2020 2012 2010 2013 ...
```



```
 $ Developer              : chr  "Game Freak" "Nintendo" "Bungie" "Game Freak" ...
 $ Publisher              : chr  "Innersloth" "Electronic Arts" "Capcom" "Nintendo" ...
 $ Release.Year           : int  2015 2015 2012 2015 2022 2017 2020 2012 2010 2013 ...
 $ Genre                  : chr  "Adventure" "Shooter" "Adventure" "Sports" ...
 $ Multiplayer            : chr  "No" "Yes" "Yes" "No" ...
 $ Game.Length..Hours.    : num  55.3 34.6 13.9 41.9 13.2 48.8 36.9 52.1 56.4 46 ...
 $ Graphics.Quality       : chr  "Medium" "Low" "Low" "Medium" ...
 $ Soundtrack.Quality     : chr  "Average" "Poor" "Good" "Good" ...
 $ Story.Quality          : chr  "Poor" "Poor" "Average" "Excellent" ...
 $ User.Review.Text       : chr  "Solid game, but too many bugs." "Solid game, but too many bugs." "Great game, but the graphics could be better." "Solid game, but
the graphics could be better." ...
 $ Game.Mode              : chr  "Offline" "Offline" "Offline" "Online" ...
 $ Min.Number.of.Players  : int  1 3 5 4 1 4 3 3 10 5 ...
> summary(df)
  Game.Title         User.Rating    Age.Group.Targeted     Price         Platform         Requires.Special.Device  Developer          Publisher
 Length:47774       Min.   :10.10   Length:47774       Min.   :19.99   Length:47774       Length:47774            Length:47774       Length:47774
 Class :character   1st Qu.:24.30   Class :character   1st Qu.:29.99   Class :character   Class :character        Class :character   Class :character
 Mode  :character   Median :29.70   Mode  :character   Median :39.84   Mode  :character   Mode  :character        Mode  :character   Mode  :character
                    Mean   :29.72                      Mean   :39.95
                    3rd Qu.:35.10                      3rd Qu.:49.96
                    Max.   :49.50                      Max.   :59.99
  Release.Year     Genre              Multiplayer        Game.Length..Hours. Graphics.Quality   Soundtrack.Quality Story.Quality      User.Review.Text
 Min.   :2010   Length:47774       Length:47774       Min.   : 5.00       Length:47774       Length:47774       Length:47774       Length:47774
 1st Qu.:2013   Class :character   Class :character   1st Qu.:18.80       Class :character   Class :character   Class :character   Class :character
 Median :2016   Mode  :character   Mode  :character   Median :32.50       Mode  :character   Mode  :character   Mode  :character   Mode  :character
 Mean   :2016                                         Mean   :32.48
 3rd Qu.:2020                                         3rd Qu.:46.30
 Max.   :2023                                         Max.   :60.00
  Game.Mode         Min.Number.of.Players
 Length:47774       Min.   : 1.000
 Class :character   1st Qu.: 3.000
 Mode  :character   Median : 5.000
                    Mean   : 5.117
                    3rd Qu.: 7.000
```

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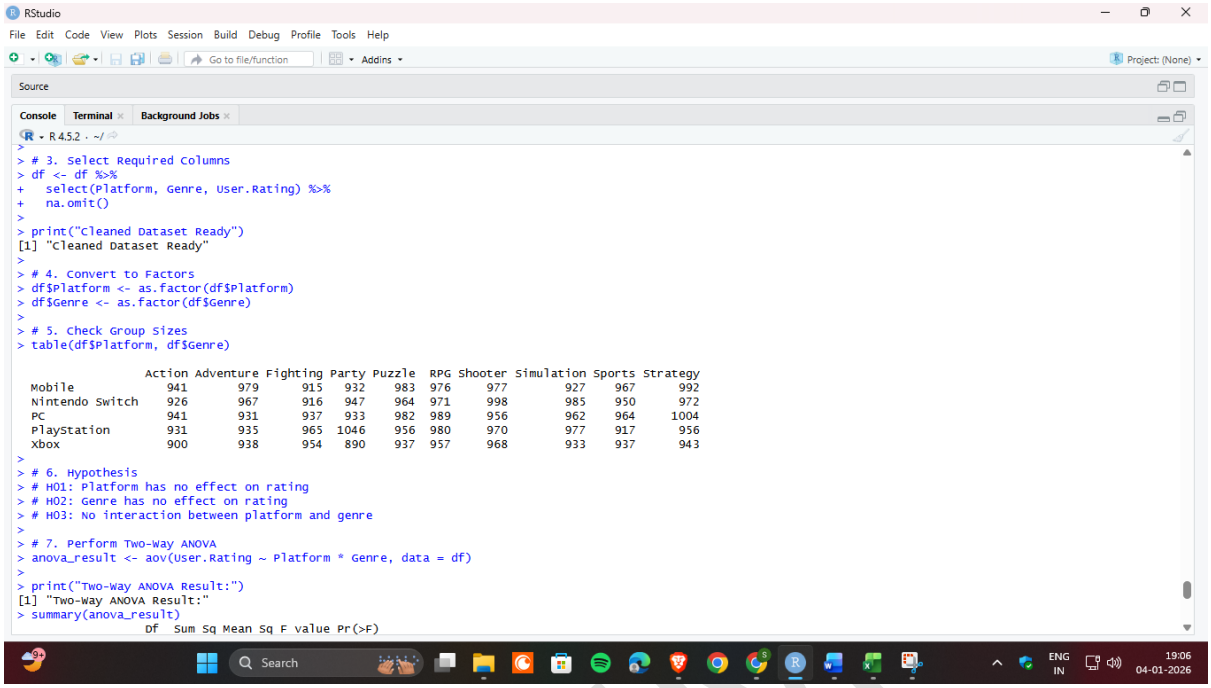
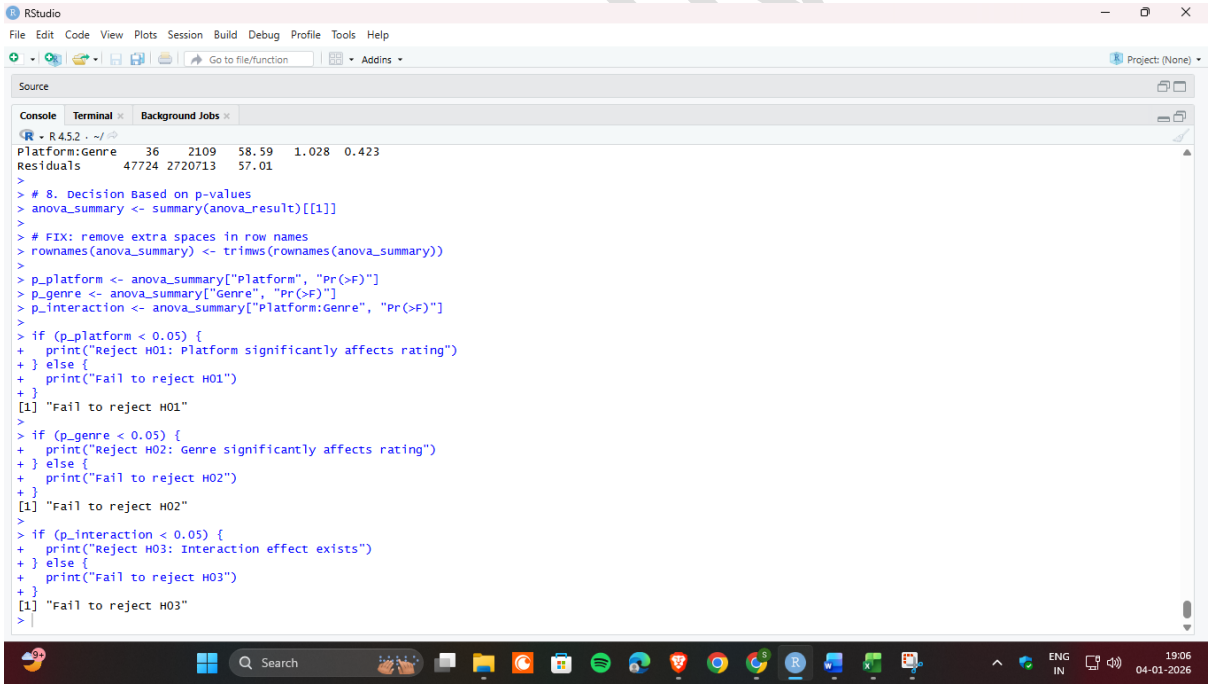


```
> # 3. Select Required Columns
> df <- df %>%
+   select(Platform, Genre, User.Rating) %>%
+   na.omit()
>
> print("Cleaned Dataset Ready")
[1] "Cleaned Dataset Ready"
>
> # 4. Convert to Factors
> df$Platform <- as.factor(df$Platform)
> df$Genre <- as.factor(df$Genre)
>
> # 5. Check Group Sizes
> table(df$Platform, df$Genre)

                Action Adventure Fighting Party Puzzle  RPG Shooter Simulation Sports Strategy
  Mobile           941       979      915   932    983  976     977        927    967      992
  Nintendo Switch  926       967      916   947    964  971     998        985    950      972
  PC               941       931      937   933    982  989     956        962    964     1004
  PlayStation      931       935      965  1046    956  980     970        977    917      956
  Xbox             900       938      954   890    937  957     968        933    937      943
>
> # 6. Hypothesis
> # H01: Platform has no effect on rating
> # H02: Genre has no effect on rating
> # H03: No interaction between platform and genre
>
> # 7. Perform Two-Way ANOVA
> anova_result <- aov(User.Rating ~ Platform * Genre, data = df)
>
> print("Two-Way ANOVA Result:")
[1] "Two-Way ANOVA Result:"
> summary(anova_result)
                Df  Sum Sq Mean Sq F value Pr(>F)
```



```
Platform:Genre    36    2109   58.59   1.028  0.423
Residuals      47724 2720713   57.01
>
> # 8. Decision Based on p-values
> anova_summary <- summary(anova_result)[[1]]
>
> # FIX: remove extra spaces in row names
> rownames(anova_summary) <- trimws(rownames(anova_summary))
>
> p_platform <- anova_summary["Platform", "Pr(>F)"]
> p_genre <- anova_summary["Genre", "Pr(>F)"]
> p_interaction <- anova_summary["Platform:Genre", "Pr(>F)"]
>
> if (p_platform < 0.05) {
+   print("Reject H01: Platform significantly affects rating")
+ } else {
+   print("Fail to reject H01")
+ }
[1] "Fail to reject H01"
>
> if (p_genre < 0.05) {
+   print("Reject H02: Genre significantly affects rating")
+ } else {
+   print("Fail to reject H02")
+ }
[1] "Fail to reject H02"
>
> if (p_interaction < 0.05) {
+   print("Reject H03: Interaction effect exists")
+ } else {
+   print("Fail to reject H03")
+ }
[1] "Fail to reject H03"
>
```

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