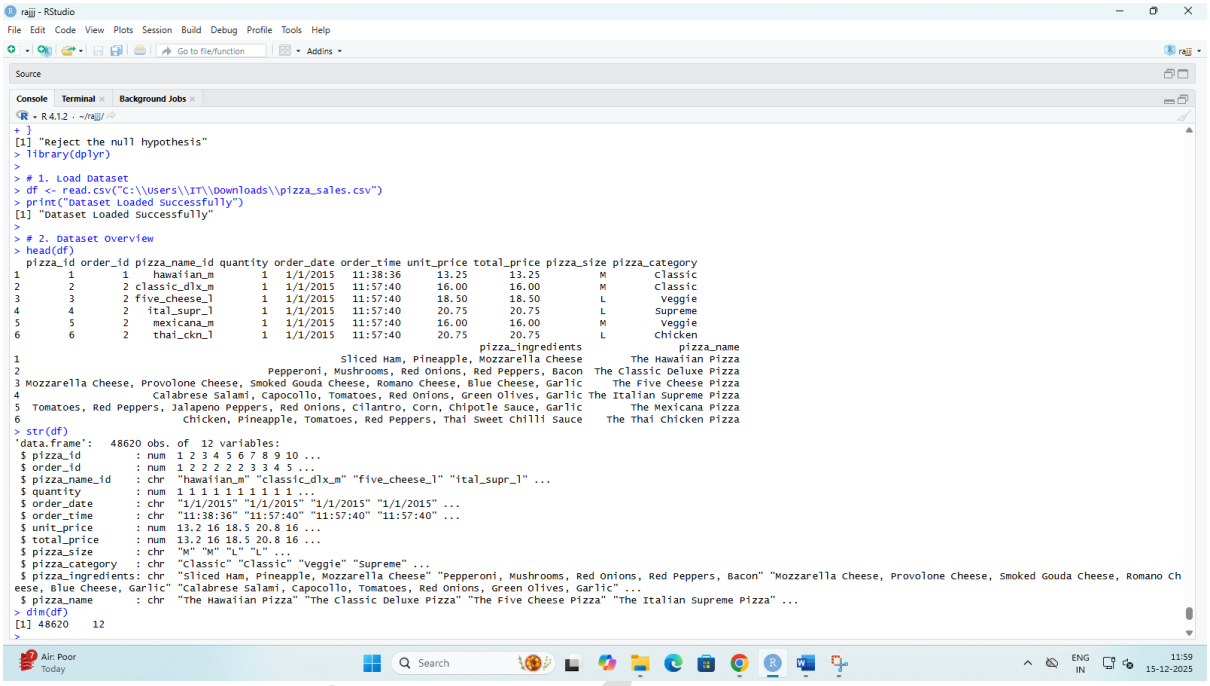
SHETH L.U.J AND SIR M.V. COLLEGE

SUBJECT :- DATA ANALYSIS WITH SAS/SPSS/R

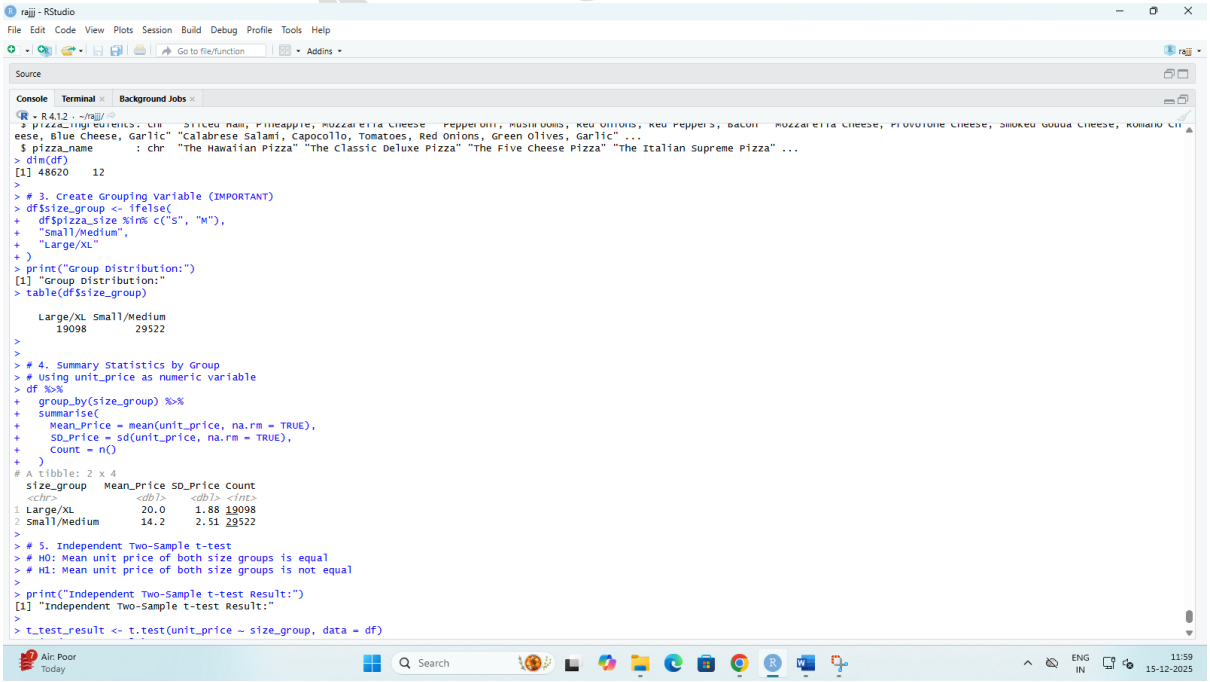
MODULE 2 - PRACTICAL – 5

AIM:- Performing independent two-sample t-tests using t.test() with grouping (R)

OUTPUT:-



```
+ }
[1] "Reject the null hypothesis"
> library(dplyr)
>
> # 1. Load Dataset
> df <- read.csv("C:\\Users\\IT\\Downloads\\pizza_sales.csv")
> print("Dataset Loaded Successfully")
[1] "Dataset Loaded Successfully"
>
> # 2. Dataset Overview
> head(df)
  pizza_id order_id pizza_name_id quantity order_date order_time unit_price total_price pizza_size pizza_category
1        1        1    hawaiian_m        1   1/1/2015   11:38:36      13.25       13.25          M        Classic
2        2        2 classic_dlx_m        1   1/1/2015   11:57:40      16.00       16.00          M        Classic
3        3        2 five_cheese_l        1   1/1/2015   11:57:40      18.50       18.50          L         Veggie
4        4        2   ital_supr_l        1   1/1/2015   11:57:40      20.75       20.75          L        Supreme
5        5        2    mexicana_m        1   1/1/2015   11:57:40      16.00       16.00          M         Veggie
6        6        2    thai_ckn_l        1   1/1/2015   11:57:40      20.75       20.75          L        Chicken
                                      pizza_ingredients                pizza_name
1                                 Sliced Ham, Pineapple, Mozzarella Cheese       The Hawaiian Pizza
2                              Pepperoni, Mushrooms, Red Onions, Red Peppers, Bacon  The Classic Deluxe Pizza
3 Mozzarella Cheese, Provolone Cheese, Smoked Gouda Cheese, Romano Cheese, Blue Cheese, Garlic     The Five Cheese Pizza
4                  Calabrese Salami, Capocollo, Tomatoes, Red Onions, Green Olives, Garlic The Italian Supreme Pizza
5  Tomatoes, Red Peppers, Jalapeno Peppers, Red Onions, Cilantro, Corn, Chipotle Sauce, Garlic       The Mexicana Pizza
6                      Chicken, Pineapple, Tomatoes, Red Peppers, Thai Sweet Chilli Sauce    The Thai Chicken Pizza
> str(df)
'data.frame':   48620 obs. of  12 variables:
 $ pizza_id         : num  1 2 3 4 5 6 7 8 9 10 ...
 $ order_id         : num  1 2 2 2 2 2 3 3 4 5 ...
 $ pizza_name_id    : chr  "hawaiian_m" "classic_dlx_m" "five_cheese_l" "ital_supr_l" ...
 $ quantity         : num  1 1 1 1 1 1 1 1 1 1 ...
 $ order_date       : chr  "1/1/2015" "1/1/2015" "1/1/2015" "1/1/2015" ...
 $ order_time       : chr  "11:38:36" "11:57:40" "11:57:40" "11:57:40" ...
 $ unit_price       : num  13.2 16 18.5 20.8 16 ...
 $ total_price      : num  13.2 16 18.5 20.8 16 ...
 $ pizza_size       : chr  "M" "M" "L" "L" ...
 $ pizza_category   : chr  "Classic" "Classic" "Veggie" "Supreme" ...
 $ pizza_ingredients: chr  "Sliced Ham, Pineapple, Mozzarella Cheese" "Pepperoni, Mushrooms, Red Onions, Red Peppers, Bacon" "Mozzarella Cheese, Provolone Cheese, Smoked Gouda Cheese, Romano Ch
eese, Blue Cheese, Garlic" "Calabrese Salami, Capocollo, Tomatoes, Red Onions, Green Olives, Garlic" ...
 $ pizza_name       : chr  "The Hawaiian Pizza" "The Classic Deluxe Pizza" "The Five Cheese Pizza" "The Italian Supreme Pizza" ...
> dim(df)
[1] 48620    12
>
```



```
eese, Blue Cheese, Garlic" "Calabrese Salami, Capocollo, Tomatoes, Red Onions, Green Olives, Garlic" ...
 $ pizza_name       : chr  "The Hawaiian Pizza" "The Classic Deluxe Pizza" "The Five Cheese Pizza" "The Italian Supreme Pizza" ...
> dim(df)
[1] 48620    12
>
> # 3. Create Grouping Variable (IMPORTANT)
> df$size_group <- ifelse(
+   df$pizza_size %in% c("S", "M"),
+   "Small/Medium",
+   "Large/XL"
+ )
> print("Group Distribution:")
[1] "Group Distribution:"
> table(df$size_group)

    Large/XL Small/Medium
       19098        29522
>
>
> # 4. Summary Statistics by Group
> # Using unit_price as numeric variable
> df %>%
+   group_by(size_group) %>%
+   summarise(
+     Mean_Price = mean(unit_price, na.rm = TRUE),
+     SD_Price = sd(unit_price, na.rm = TRUE),
+     Count = n()
+   )
# A tibble: 2 x 4
  size_group   Mean_Price SD_Price Count
  <chr>             <dbl>    <dbl> <int>
1 Large/XL           20.0     1.88 19098
2 Small/Medium       14.2     2.51 29522
>
> # 5. Independent Two-Sample t-test
> # H0: Mean unit price of both size groups is equal
> # H1: Mean unit price of both size groups is not equal
>
> print("Independent Two-Sample t-test Result:")
[1] "Independent Two-Sample t-test Result:"
>
> t_test_result <- t.test(unit_price ~ size_group, data = df)
```

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S124

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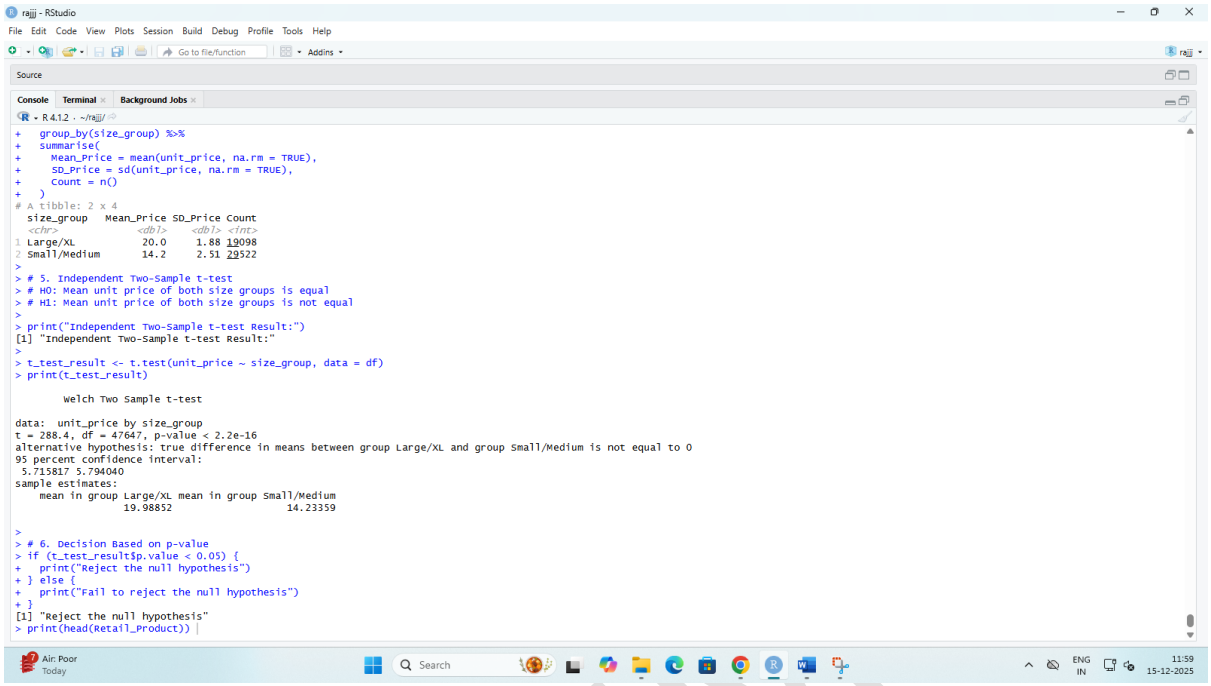

```
+   group_by(size_group) %>%
+   summarise(
+     Mean_Price = mean(unit_price, na.rm = TRUE),
+     SD_Price = sd(unit_price, na.rm = TRUE),
+     Count = n()
+   )
# A tibble: 2 x 4
  size_group   Mean_Price SD_Price Count
  <chr>             <dbl>    <dbl> <int>
1 Large/XL           20.0     1.88 19098
2 Small/Medium       14.2     2.51 29522
>
> # 5. Independent Two-Sample t-test
> # H0: Mean unit price of both size groups is equal
> # H1: Mean unit price of both size groups is not equal
>
> print("Independent Two-Sample t-test Result:")
[1] "Independent Two-Sample t-test Result:"
>
> t_test_result <- t.test(unit_price ~ size_group, data = df)
> print(t_test_result)

        Welch Two Sample t-test

data:  unit_price by size_group
t = 288.4, df = 47647, p-value < 2.2e-16
alternative hypothesis: true difference in means between group Large/XL and group Small/Medium is not equal to 0
95 percent confidence interval:
 5.715817 5.794040
sample estimates:
    mean in group Large/XL mean in group Small/Medium
                  19.98852                   14.23359

>
> # 6. Decision Based on p-value
> if (t_test_result$p.value < 0.05) {
+   print("Reject the null hypothesis")
+ } else {
+   print("Fail to reject the null hypothesis")
+ }
[1] "Reject the null hypothesis"
> print(head(Retail_Product))
```


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