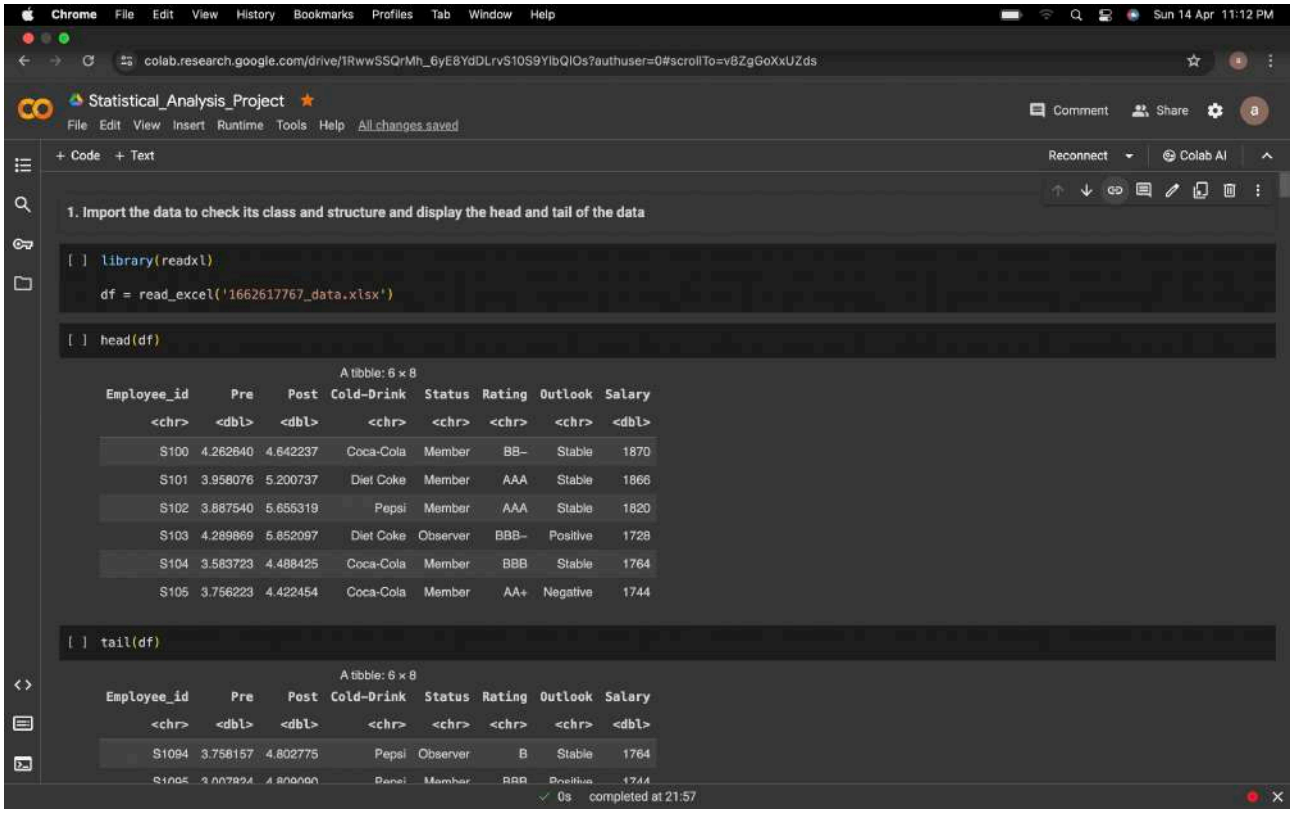
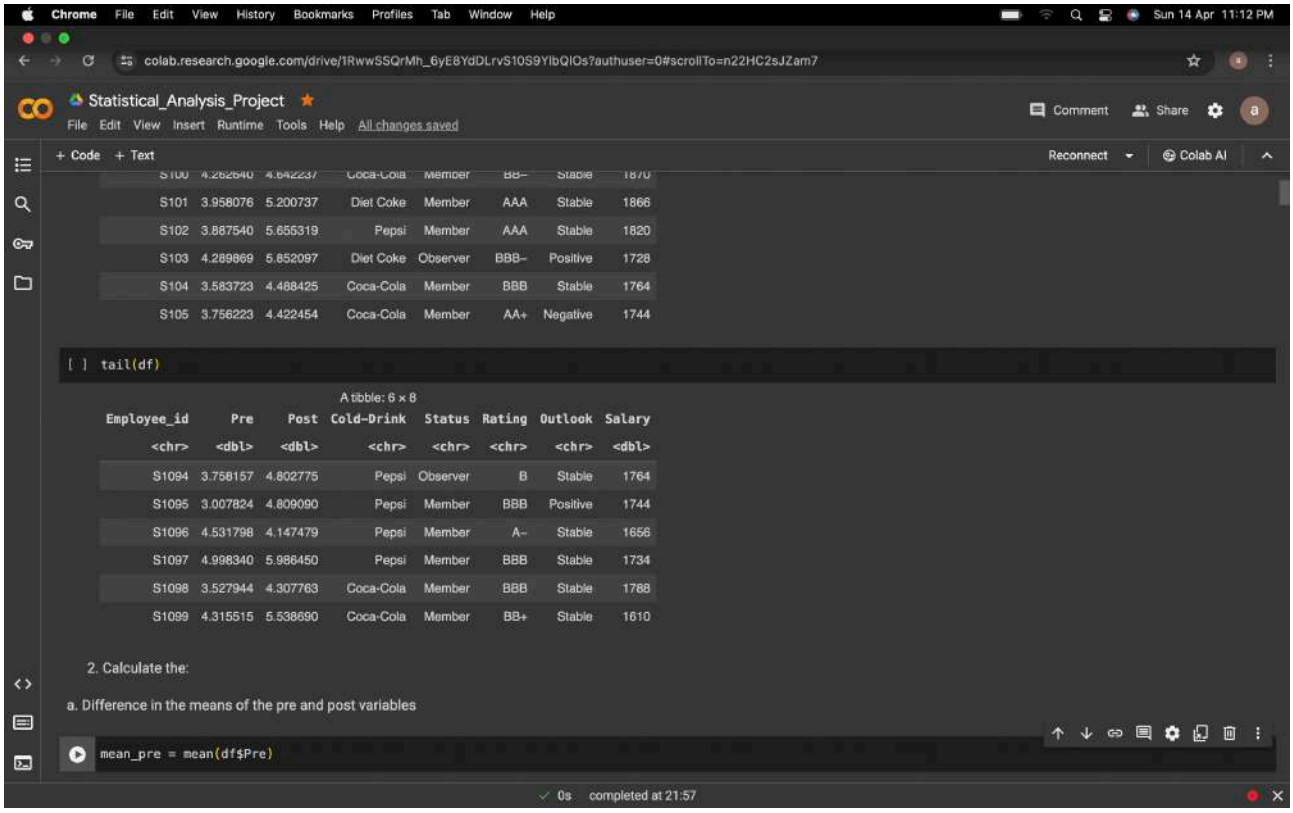
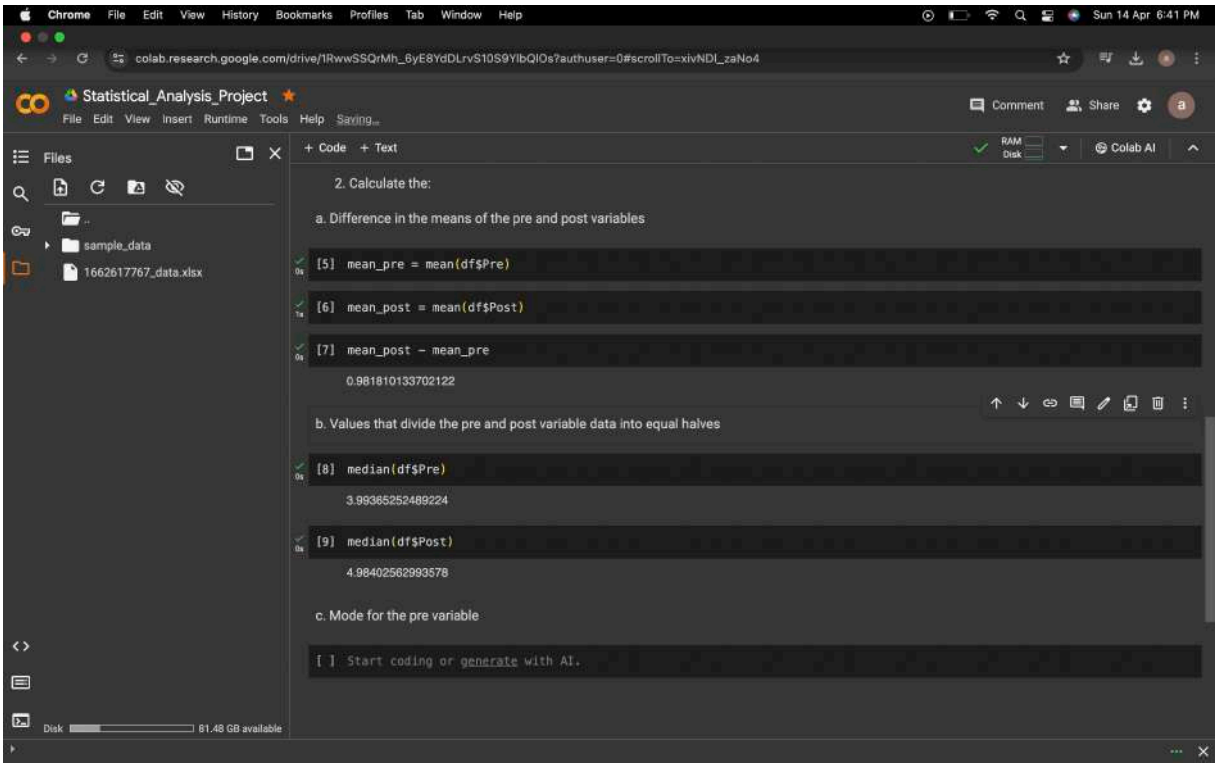
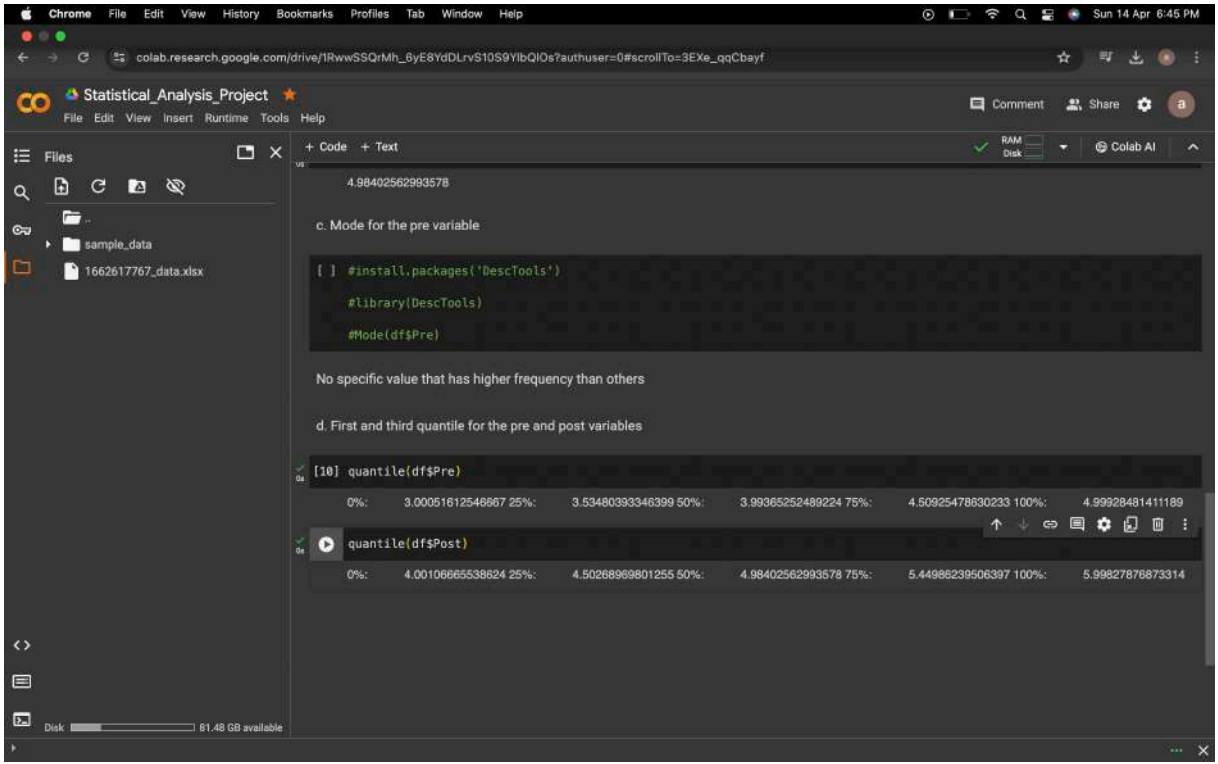
1. Import the data to check its class and structure and display the head and tail of the data

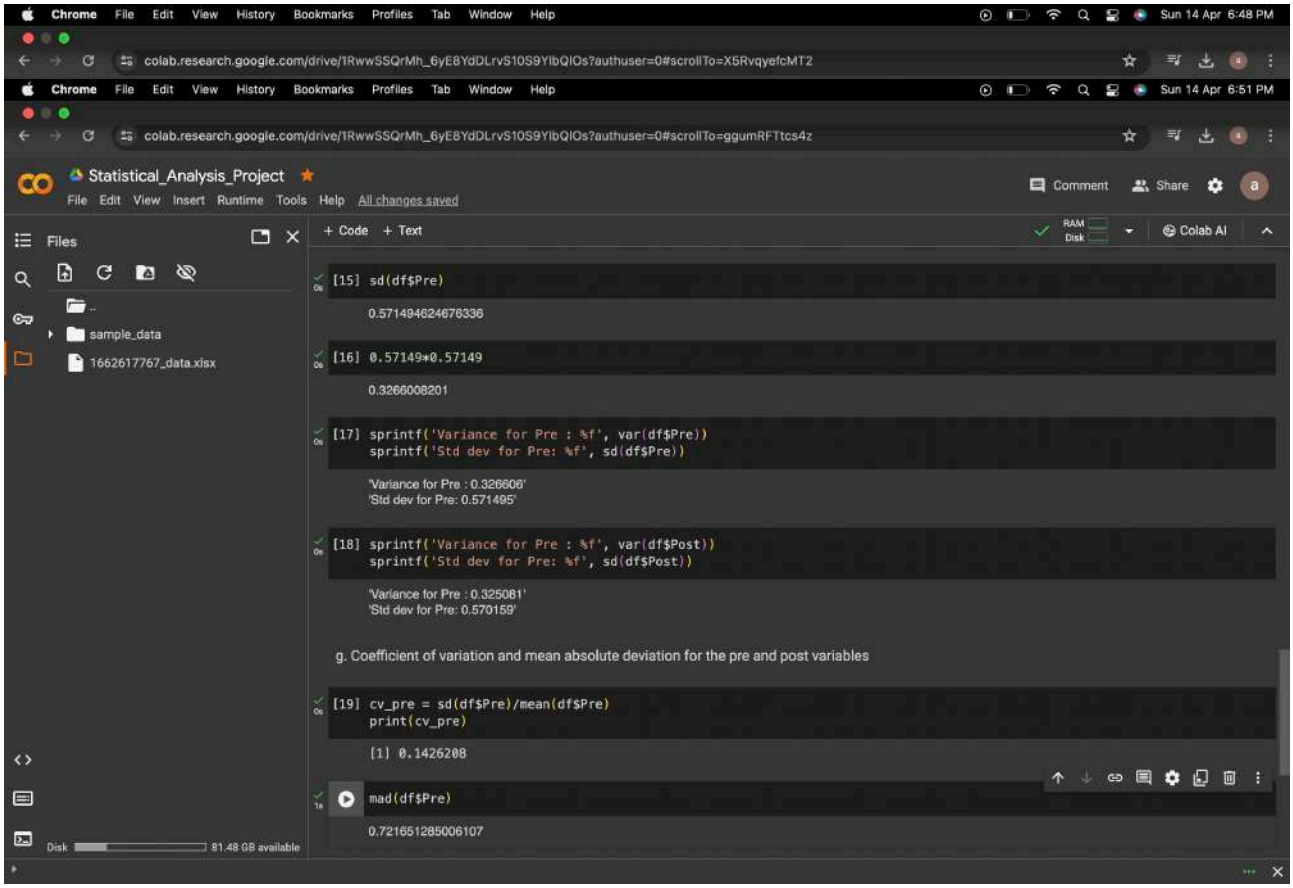




2. Calculate the:
    a. Difference in the means of the pre and post variables
    b. Values that divide the pre and post variable data into equal halves
    c. Mode for the pre variable
    d. First and third quantile for the pre and post variables
    e. Range of the pre and post variables
    f. Variance and standard deviation for the pre and post variables
    g. Coefficient of variation and mean absolute deviation for the pre and post variables
    h. Interquartile range of the pre and post variables



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Share
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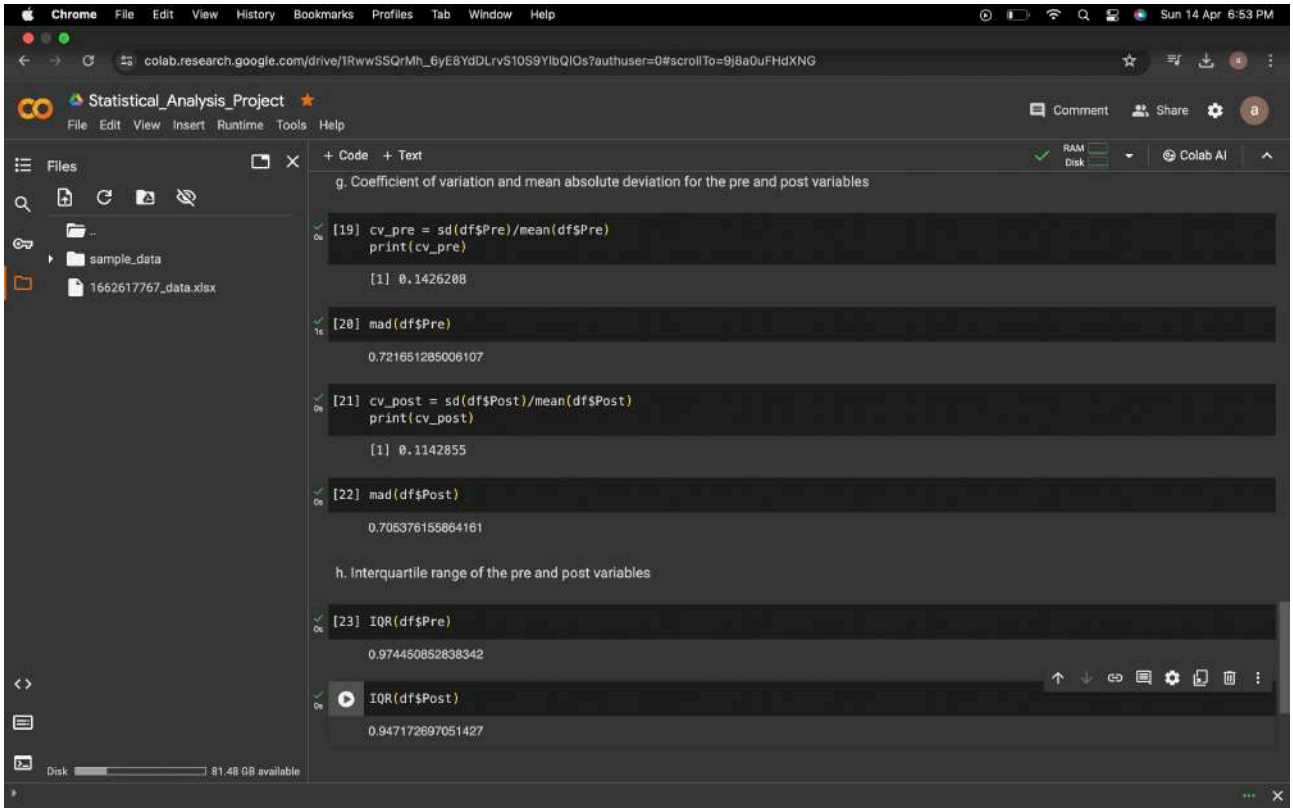
+ Code + Text
RAM
Disk
Colab AI
sample_data
1662617767_data.xlsx
[15] sd(df$Pre)
0.571494624676336
[16] 0.57149*0.57149
0.3266008201
[17] sprintf('Variance for Pre : %f', var(df$Pre))
sprintf('Std dev for Pre: %f', sd(df$Pre))
'Variance for Pre : 0.326606'
'Std dev for Pre: 0.571495'
[18] sprintf('Variance for Pre : %f', var(df$Post))
sprintf('Std dev for Pre: %f', sd(df$Post))
'Variance for Pre : 0.325081'
'Std dev for Pre: 0.570159'
g. Coefficient of variation and mean absolute deviation for the pre and post variables
[19] cv_pre = sd(df$Pre)/mean(df$Pre)
print(cv_pre)
[1] 0.1426208
mad(df$Pre)
0.721651285006107
Disk 81.48 GB available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colab.research.google.com/drive/1RwwSSQrMh_6yE8YdDLrvS10S9YlbQIOs?authuser=0#scrollTo=9j8a0uFHdXNG
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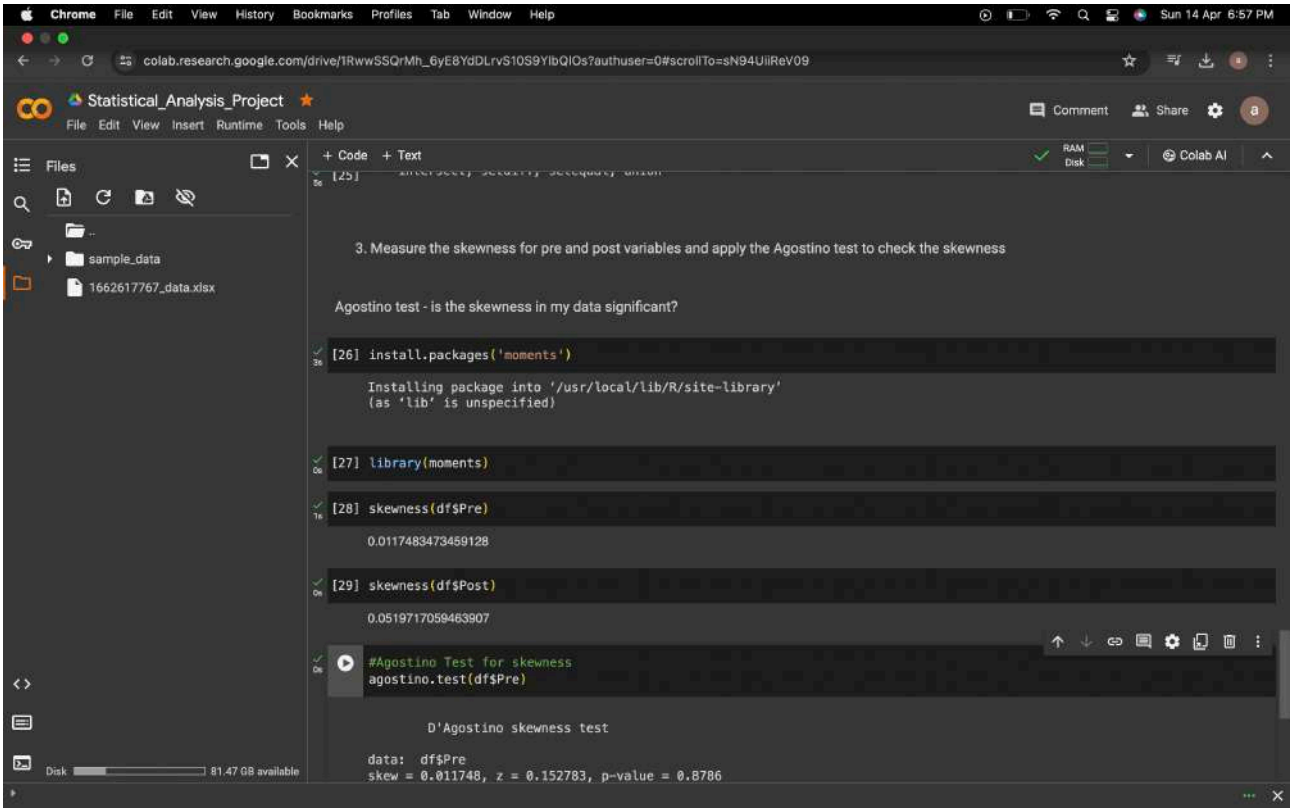
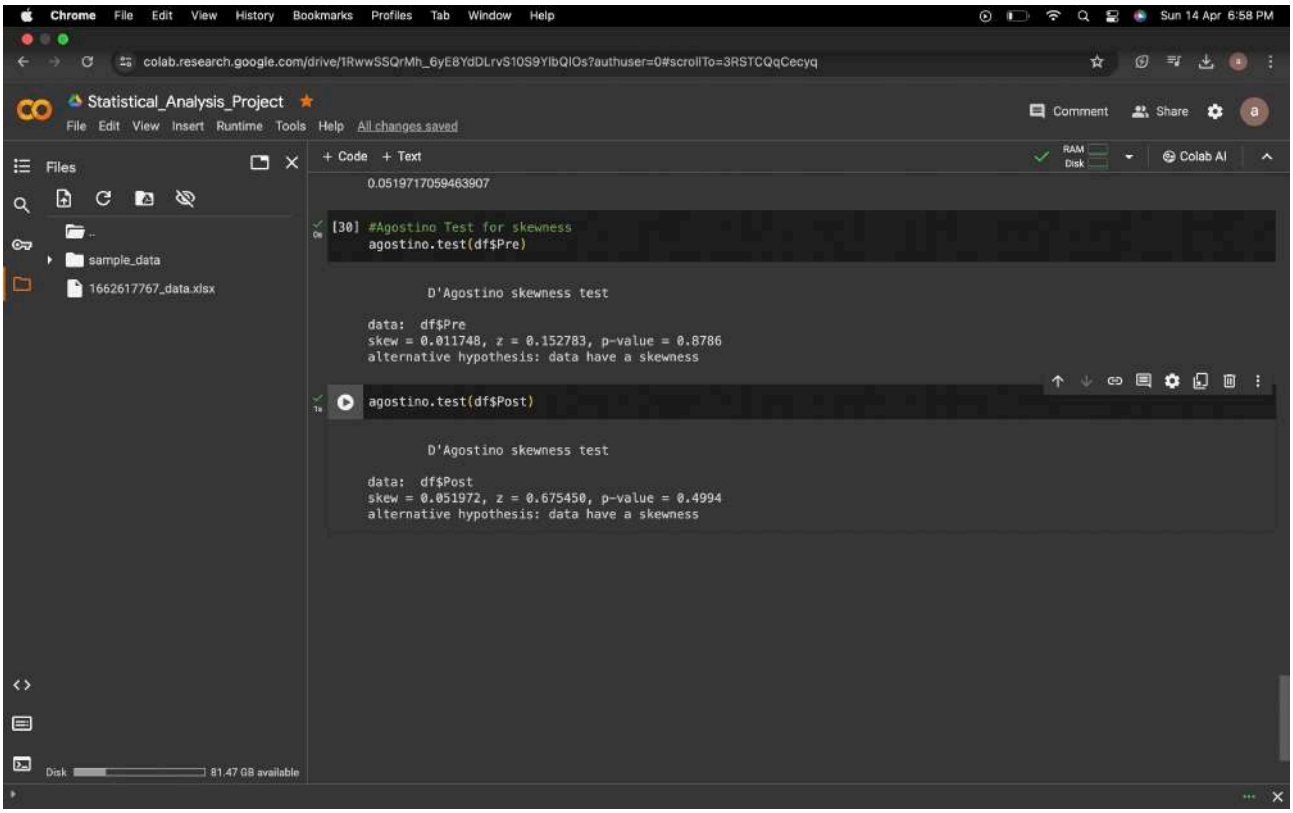
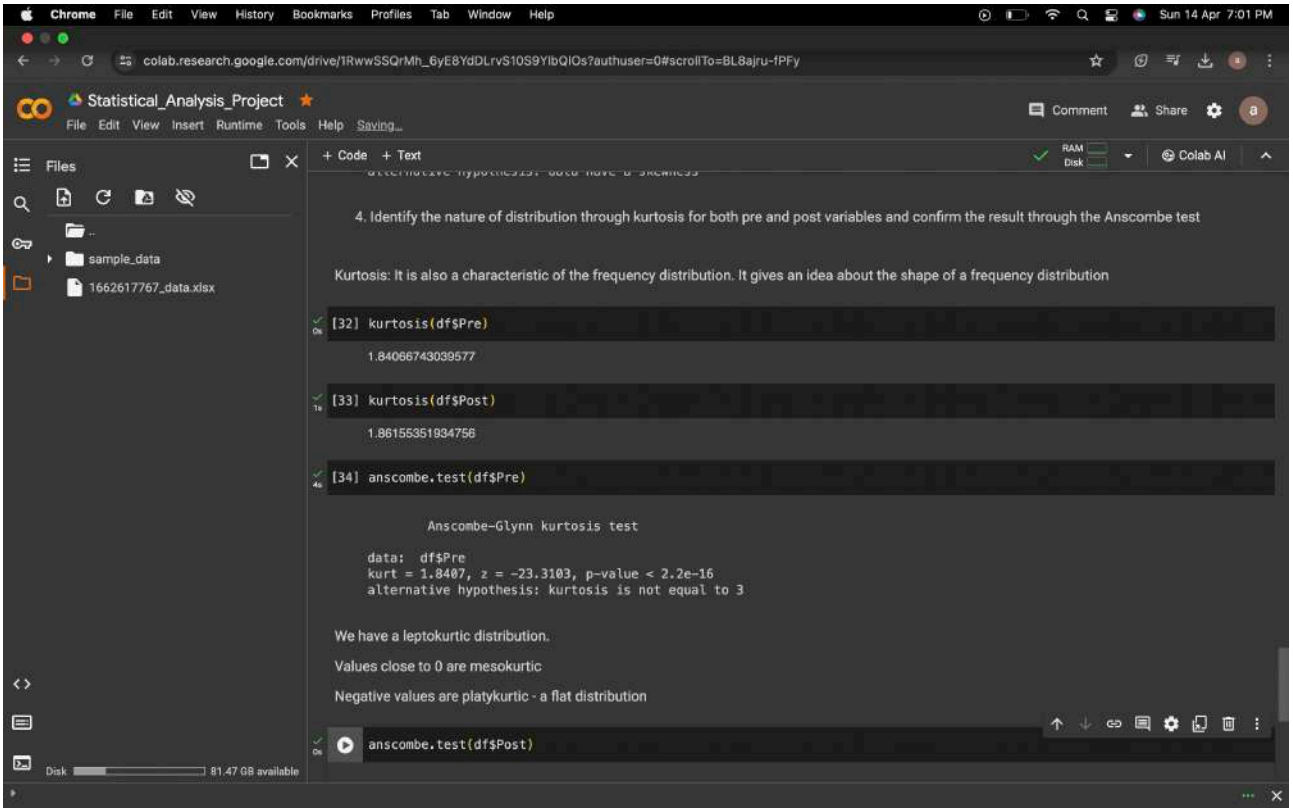
Comment
Share
Files
+ Code + Text
RAM
Disk
Colab AI
g. Coefficient of variation and mean absolute deviation for the pre and post variables
sample_data
1662617767_data.xlsx
[19] cv_pre = sd(df$Pre)/mean(df$Pre)
print(cv_pre)
[1] 0.1426208
[20] mad(df$Pre)
0.721651285006107
[21] cv_post = sd(df$Post)/mean(df$Post)
print(cv_post)
[1] 0.1142855
[22] mad(df$Post)
0.705376155864161
h. Interquartile range of the pre and post variables
[23] IQR(df$Pre)
0.974450852838342
IQR(df$Post)
0.947172697051427
Disk 81.48 GB available

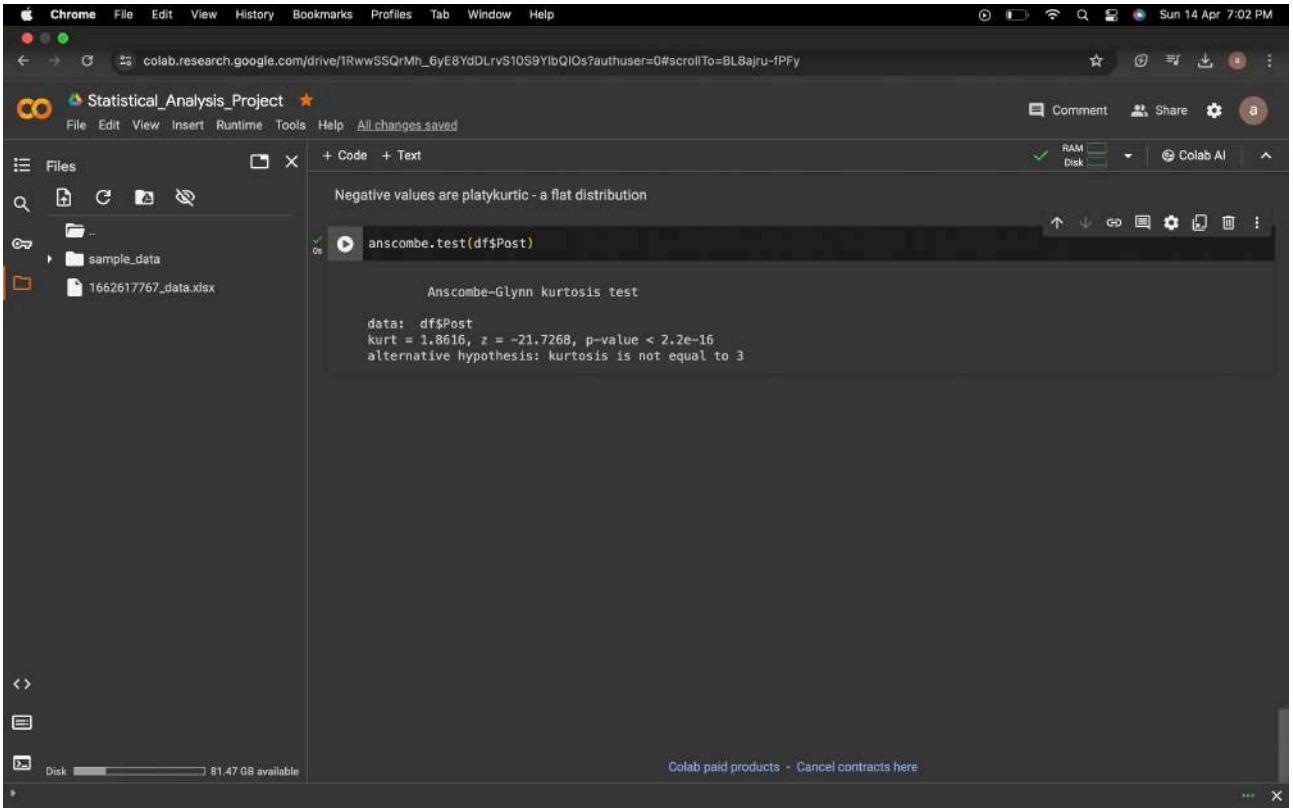
3. Measure the skewness for pre and post variables and apply the Agostino test to check the skewness



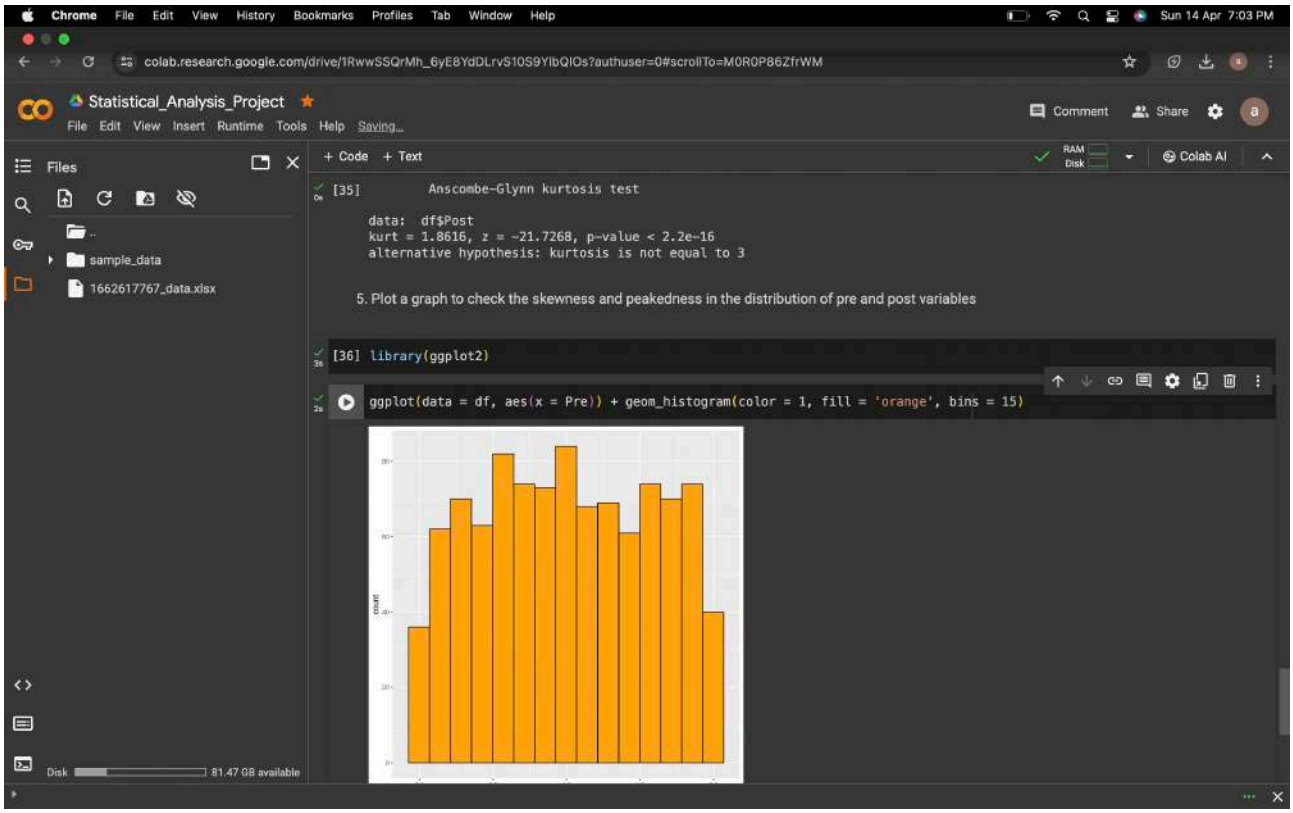


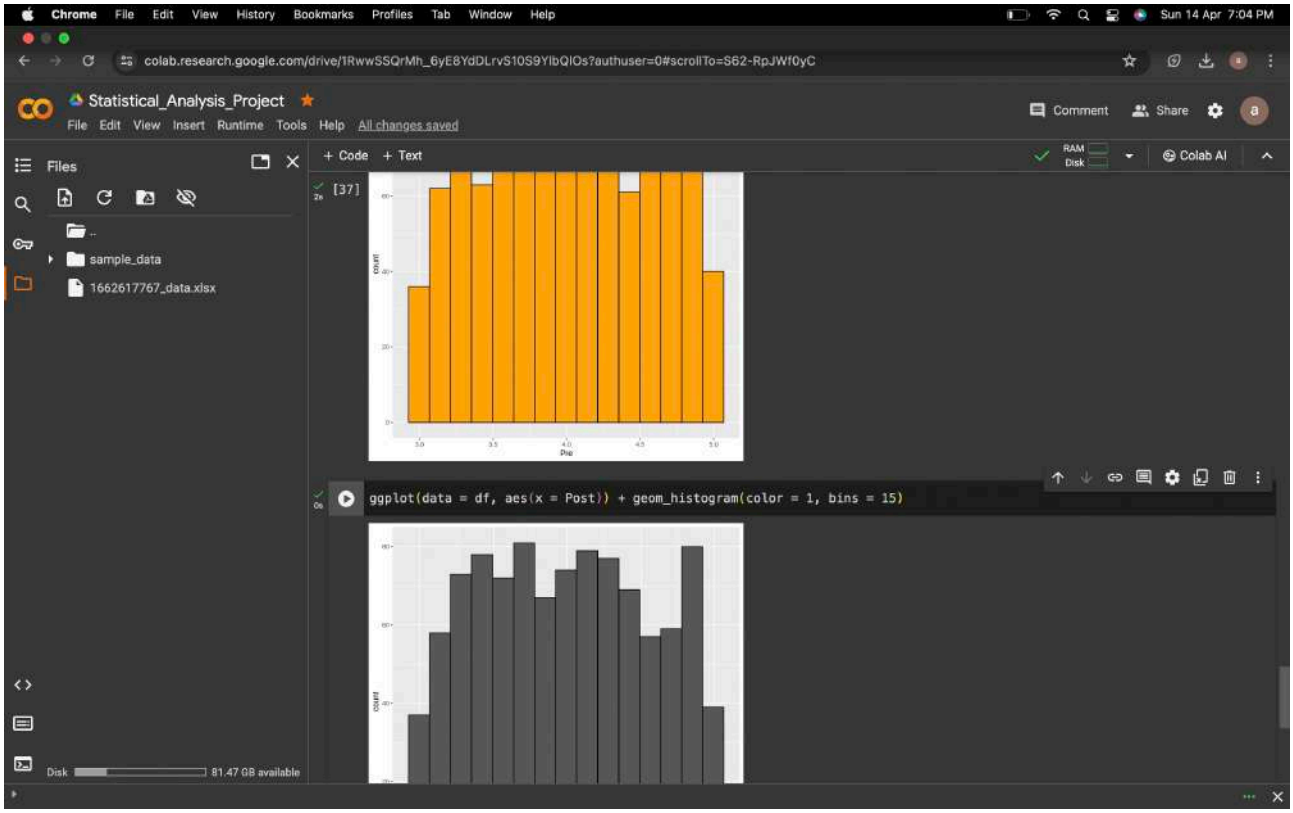
4. Identify the nature of distribution through kurtosis for both pre and post variables and confirm the result through the Anscombe test

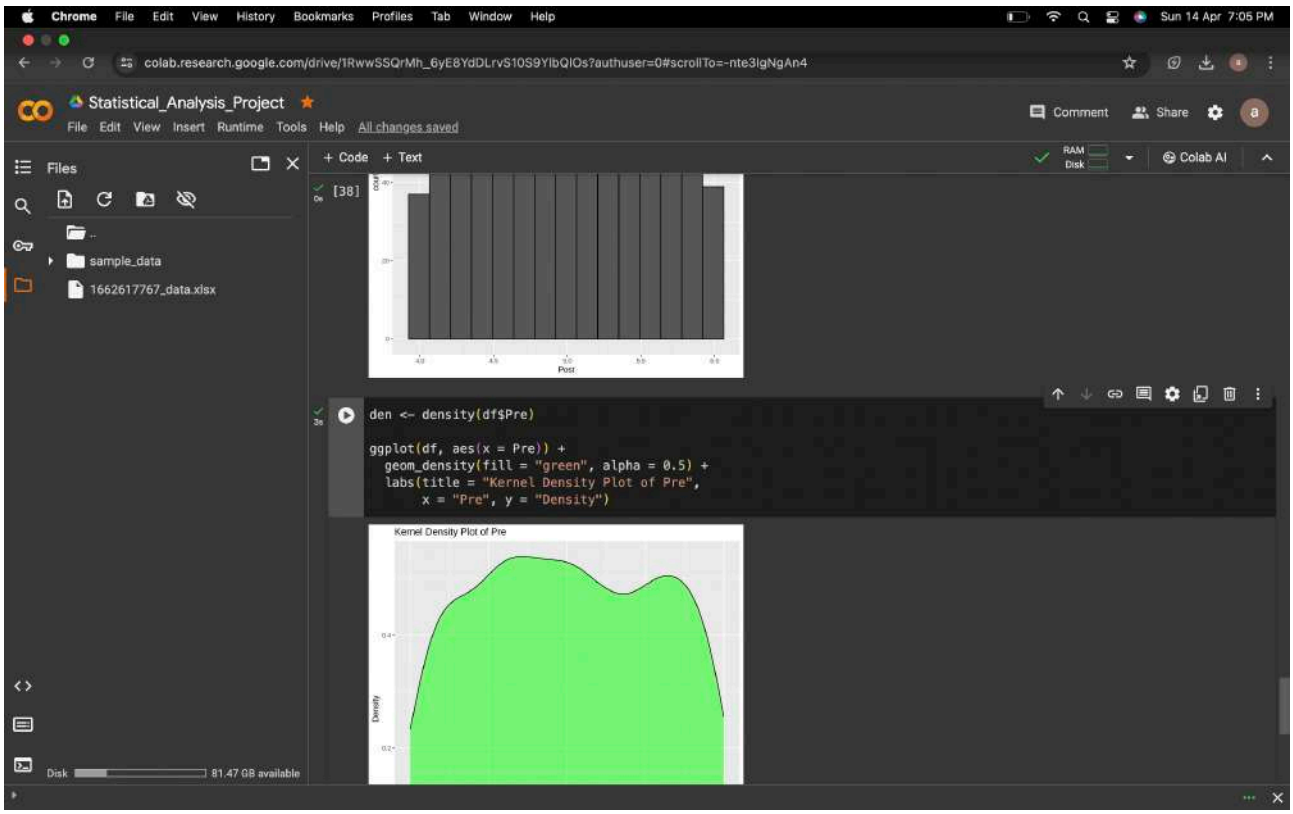




5. Plot a graph to check the skewness and peakedness in the distribution of pre and post variables



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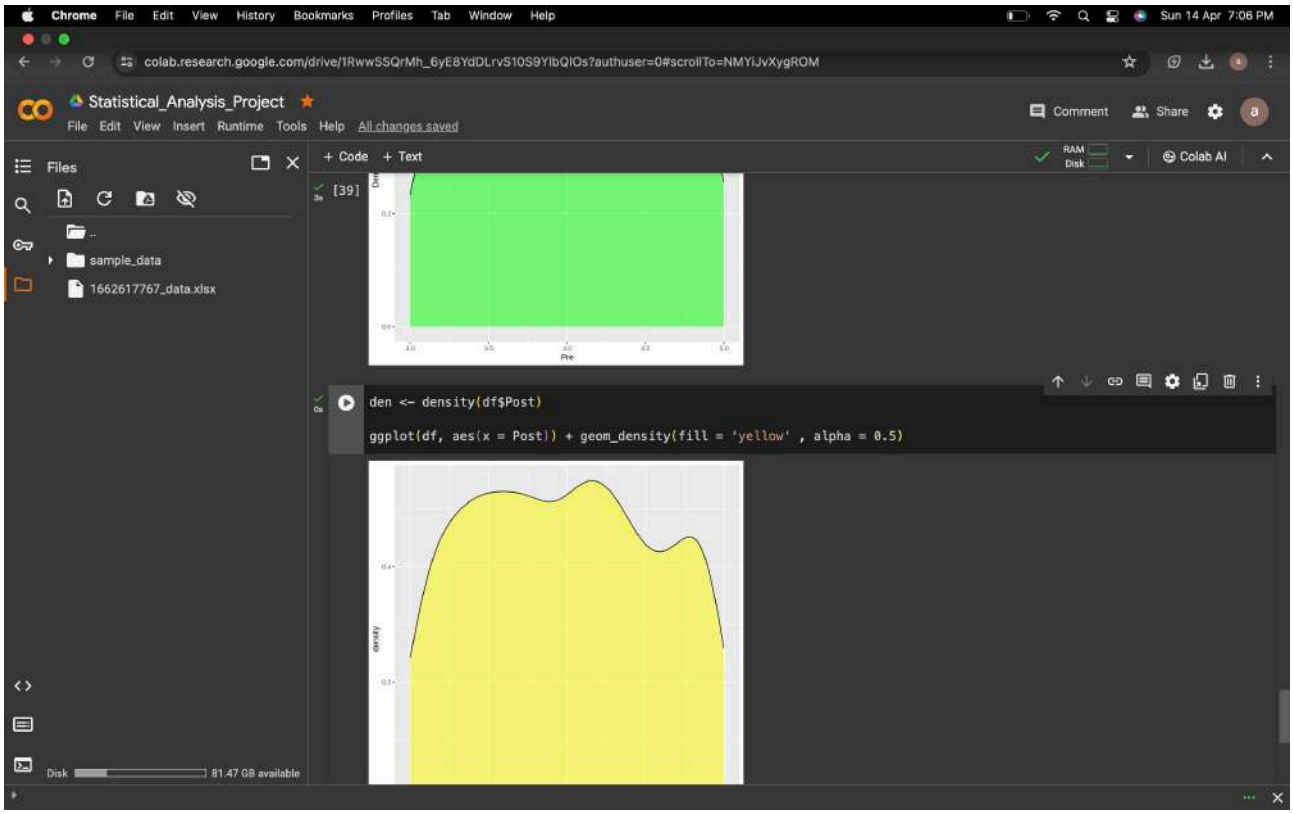
Comment
Share
Files
+ Code + Text
RAM
Disk
Colab AI
sample_data
1662617767_data.xlsx
[38]
Post
den <- density(df$Pre)
ggplot(df, aes(x = Pre)) +
geom_density(fill = "green", alpha = 0.5) +
labs(title = "Kernel Density Plot of Pre",
x = "Pre", y = "Density")
Kernel Density Plot of Pre
Density
Disk
81.47 GB available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Comment
Share
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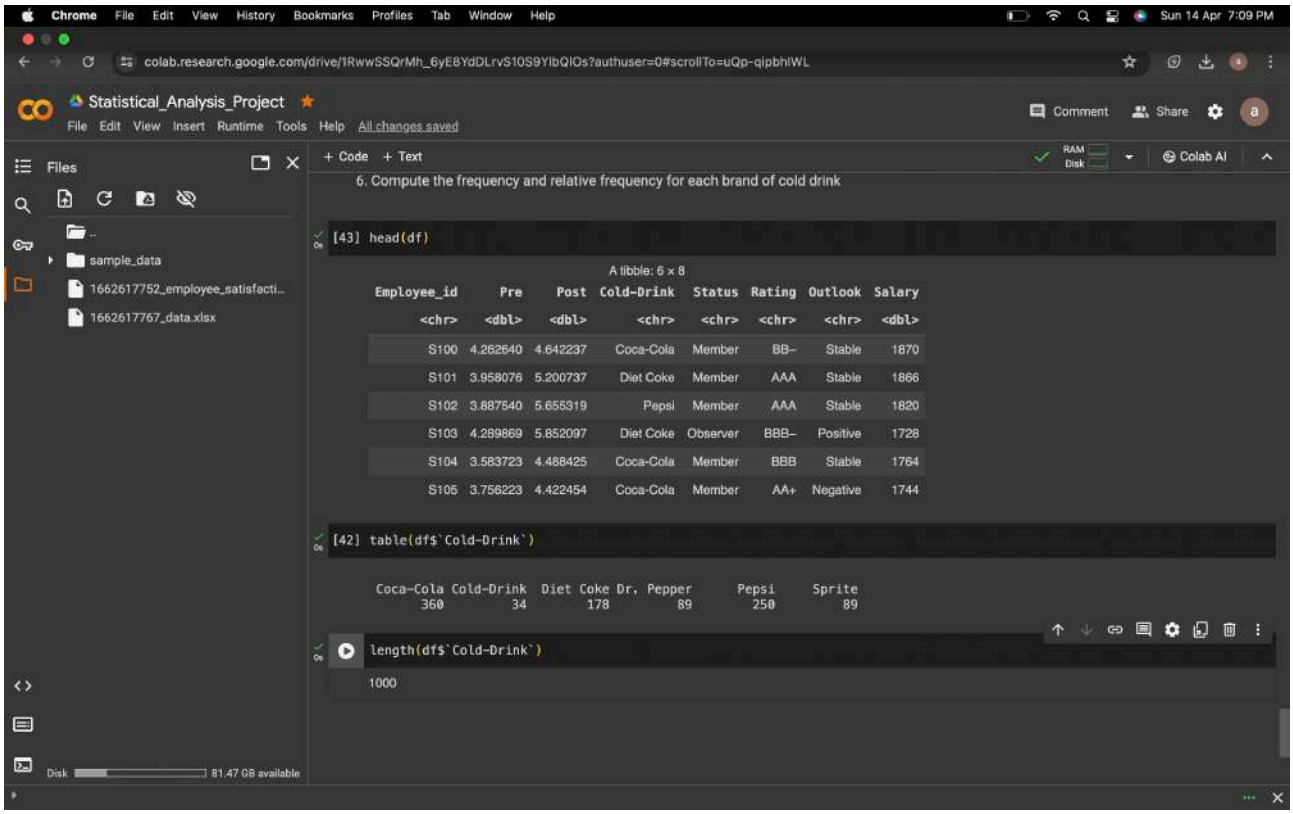
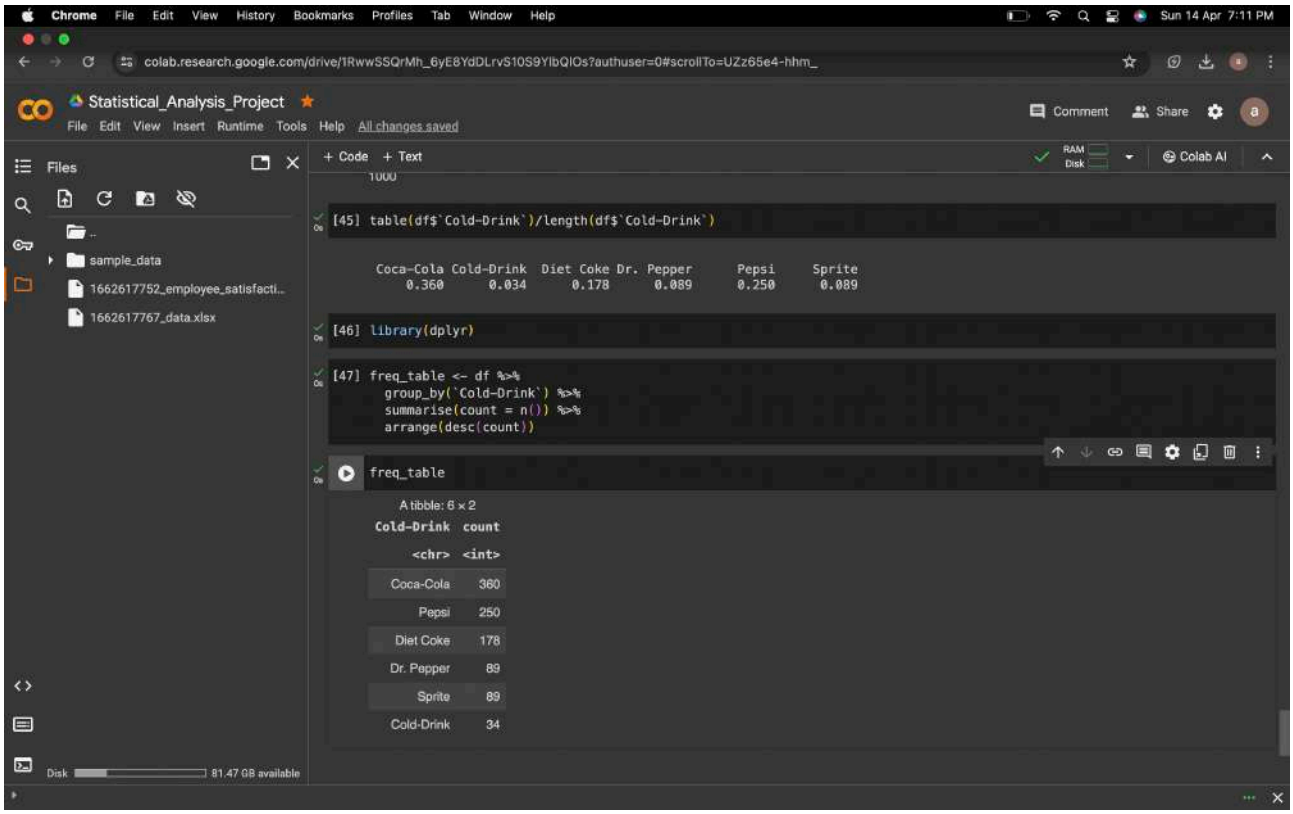
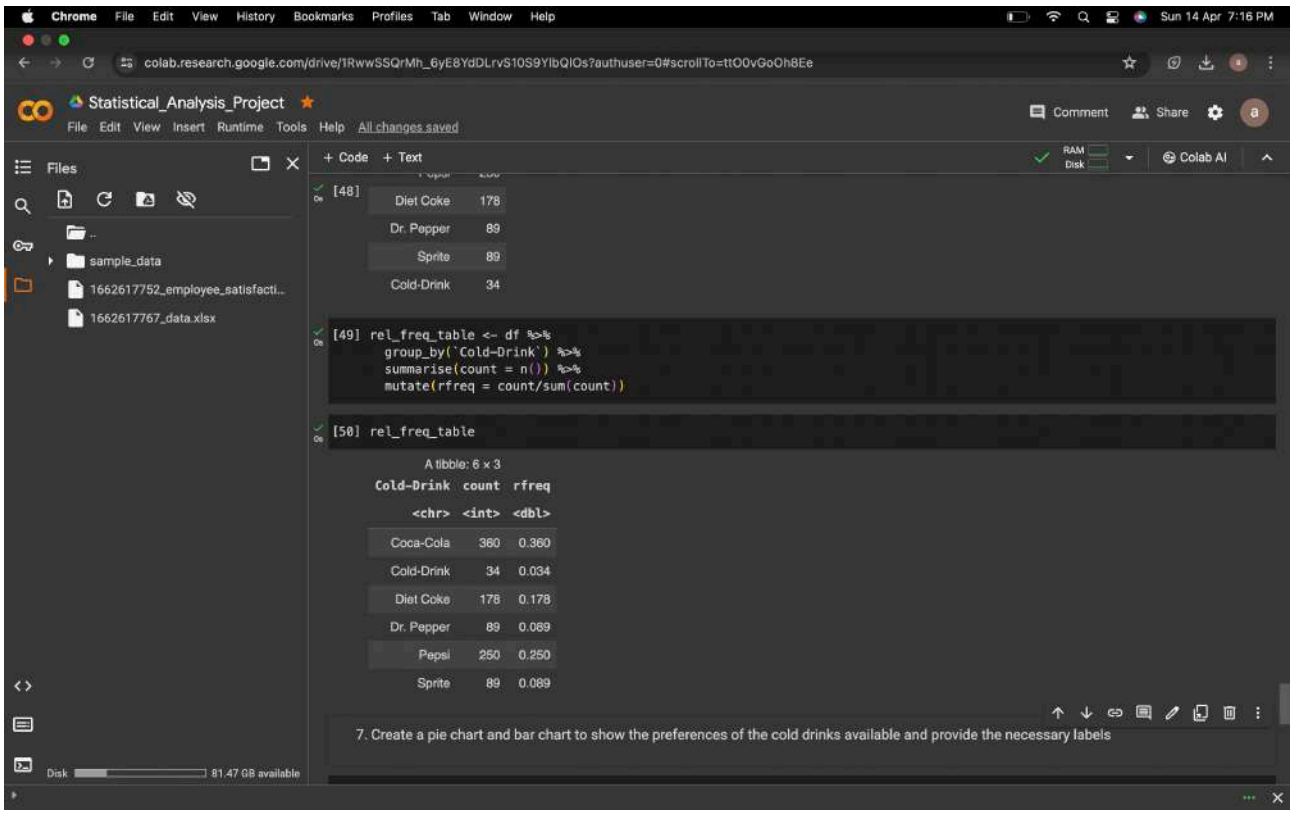
+ Code + Text
RAM
Disk
Colab AI
sample_data
1662617767_data.xlsx
[39]
Pre
den <- density(df$Post)
ggplot(df, aes(x = Post)) + geom_density(fill = 'yellow' , alpha = 0.5)
density
Disk
81.47 GB available

6. Compute the frequency and relative frequency for each brand of cold drink



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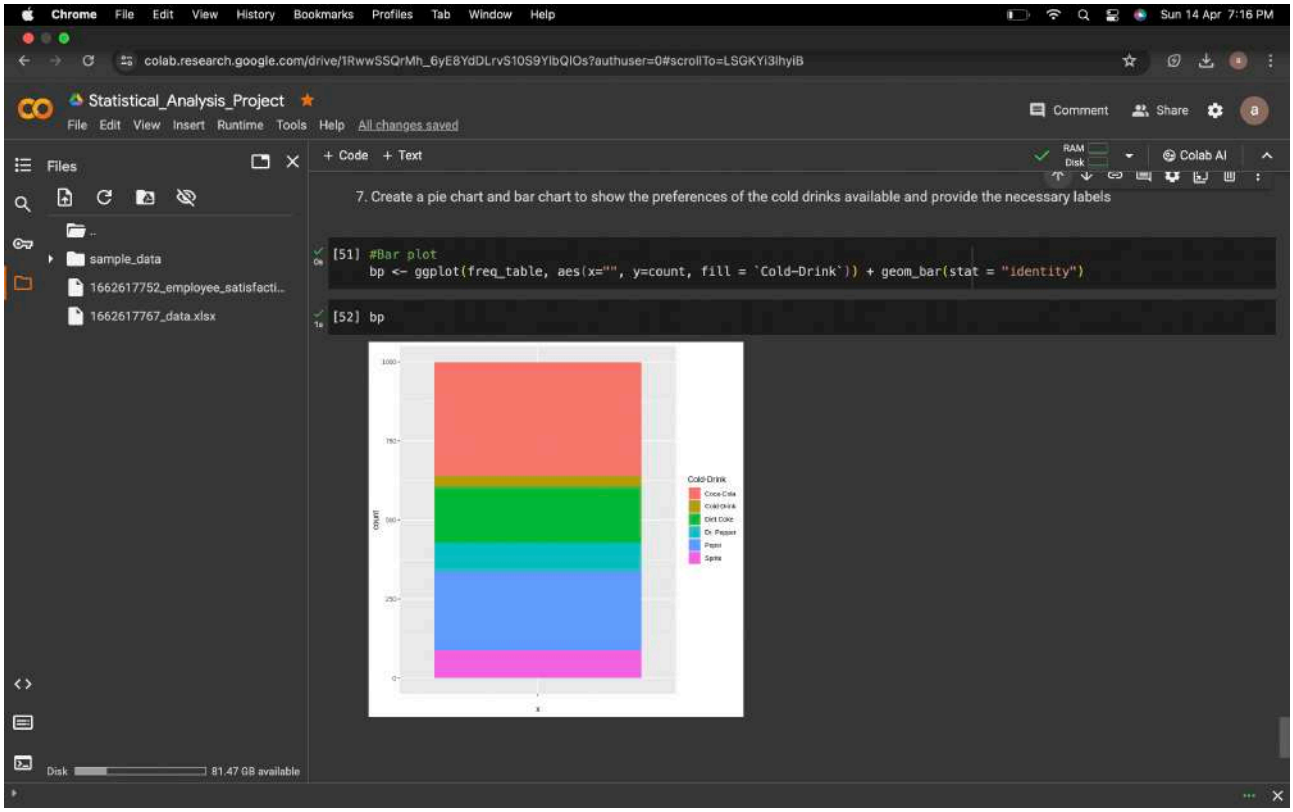
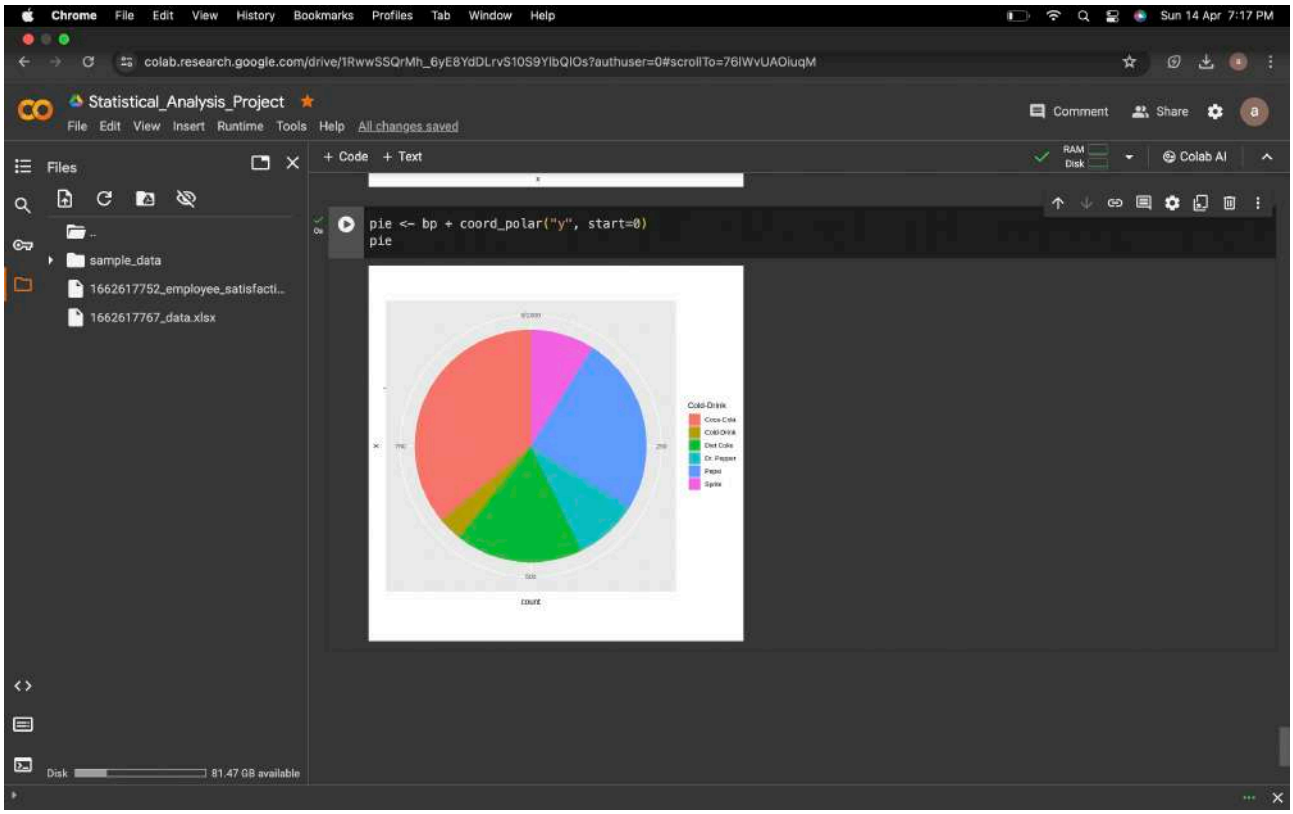
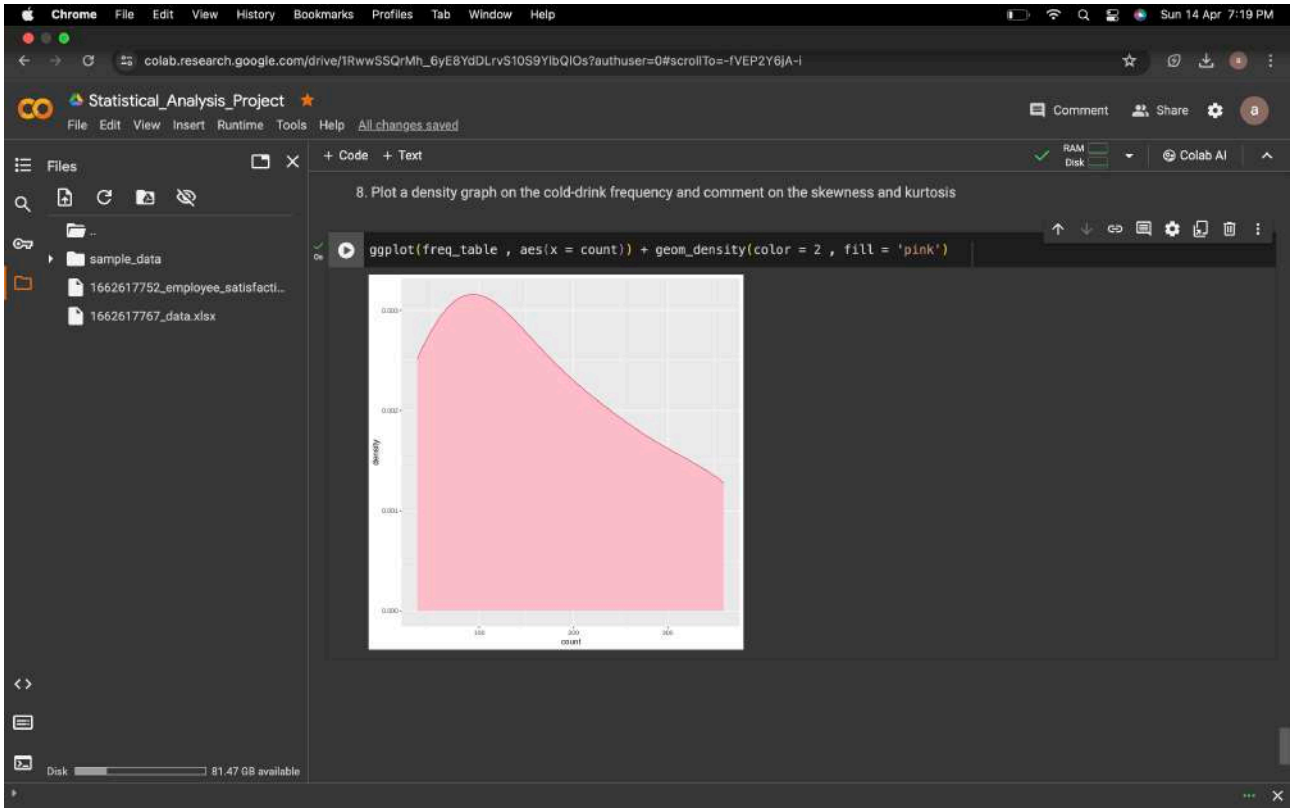
[48]
Diet Coke 178
Dr. Pepper 89
Sprite 89
Cold-Drink 34
[49] rel_freq_table <- df %>%
group_by(`Cold-Drink`) %>%
summarise(count = n()) %>%
mutate(rfreq = count/sum(count))
[50] rel_freq_table
A tibble: 6 × 3
Cold-Drink count rfreq
<chr> <int> <dbl>
Coca-Cola 360 0.360
Cold-Drink 34 0.034
Diet Coke 178 0.178
Dr. Pepper 89 0.089
Pepsi 250 0.250
Sprite 89 0.089
7. Create a pie chart and bar chart to show the preferences of the cold drinks available and provide the necessary labels
Disk 81.47 GB available

7. Create a pie chart and bar chart to show the preferences of the cold drinks available and provide the necessary labels

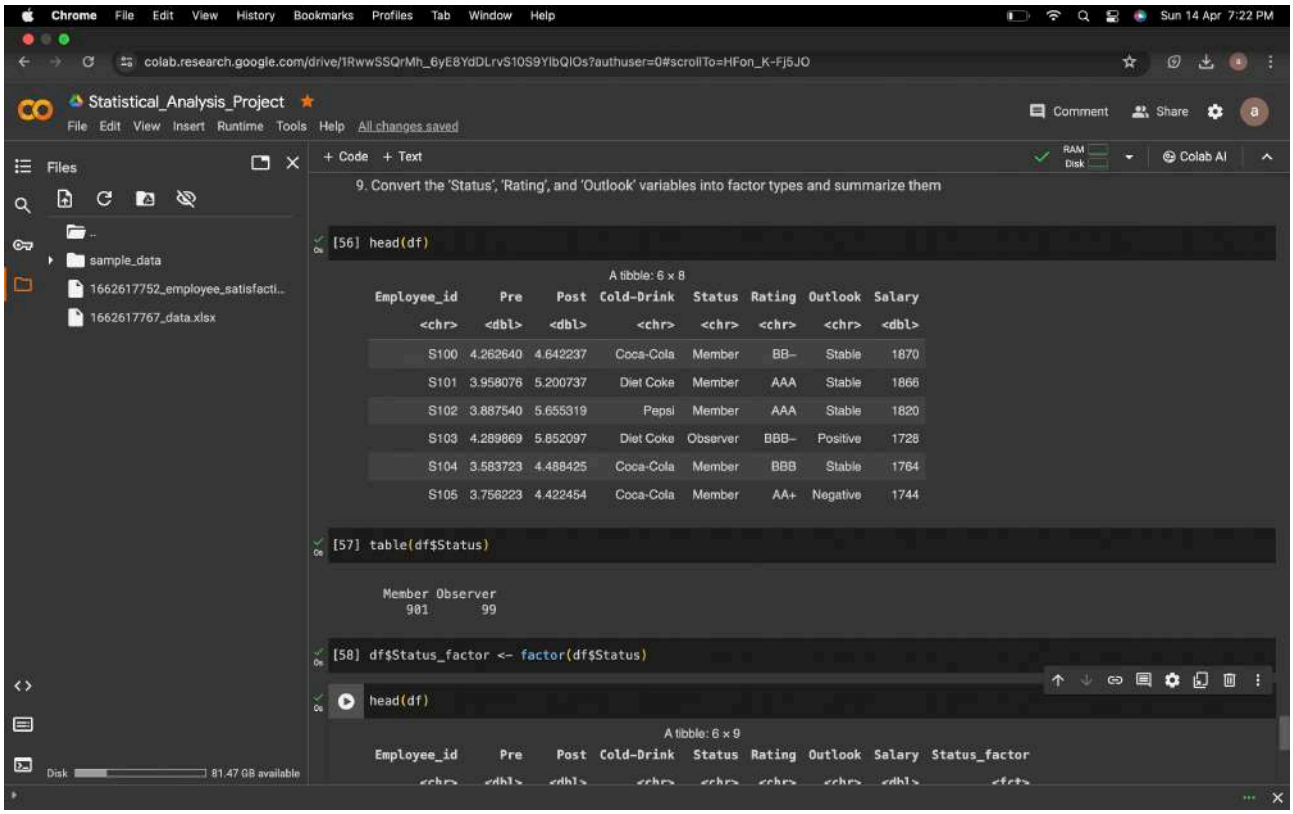


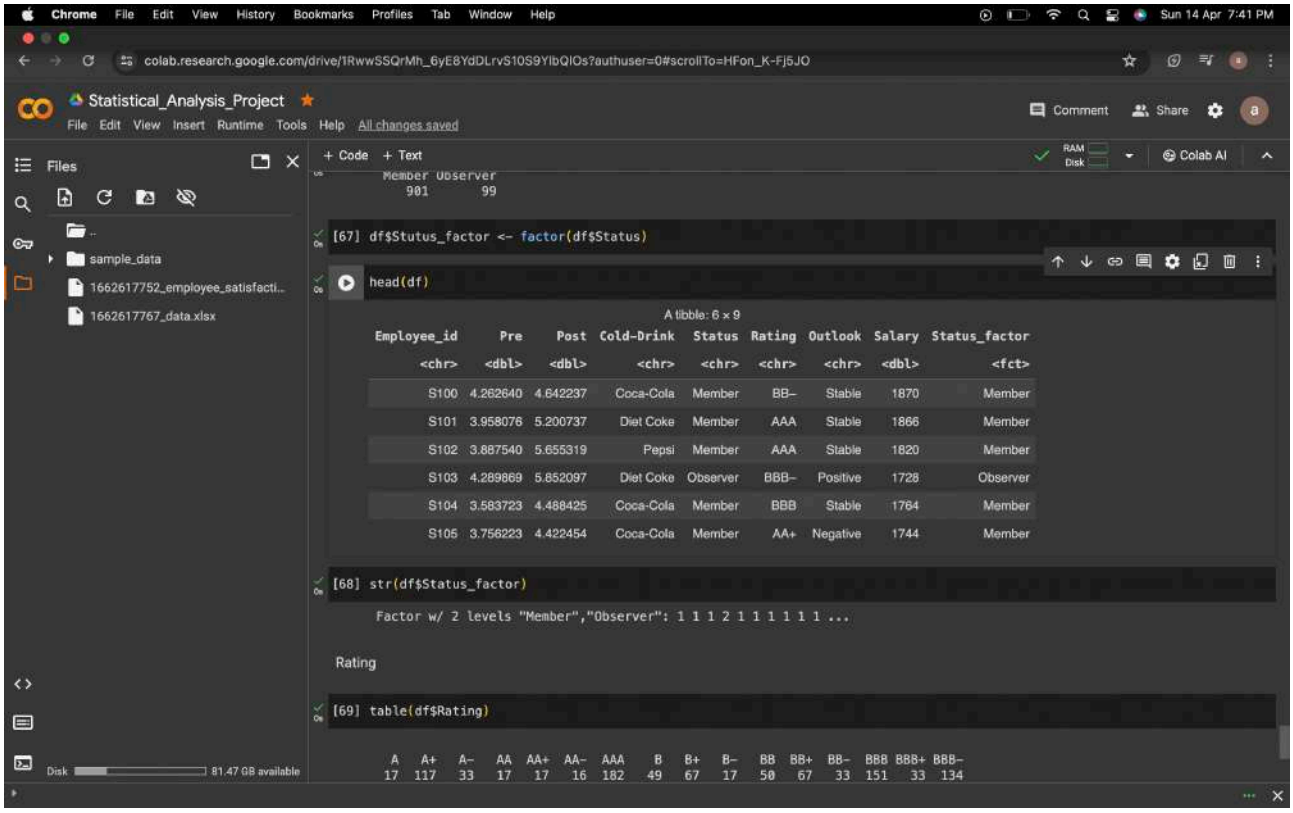


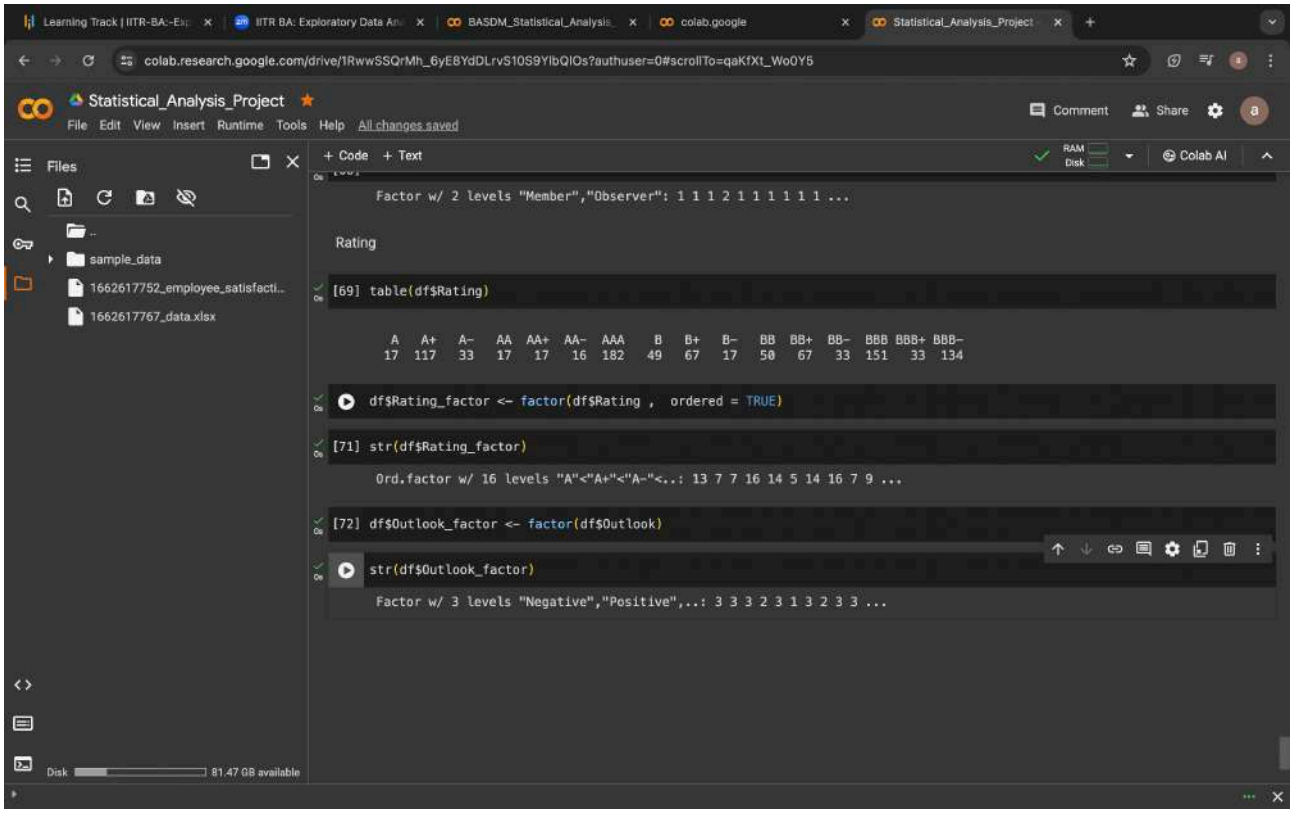
8. Plot a density graph on the cold-drink frequency and comment on the skewness and kurtosis



9. Convert the ‘Status’, ‘Rating’, and ‘Outlook’ variables into factor types and summarize them



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sample_data
1662617752_employee_satisfacti...
1662617767_data.xlsx
Factor w/ 2 levels "Member","Observer": 1 1 1 2 1 1 1 1 1 1 ...
Rating
[69] table(df$Rating)
A A+ A- AA AA+ AA- AAA B B+ B- BB BB+ BB- BBB BBB+ BBB-
17 117 33 17 17 16 182 49 67 17 50 67 33 151 33 134
df$Rating_factor <- factor(df$Rating , ordered = TRUE)
[71] str(df$Rating_factor)
Ord.factor w/ 16 levels "A"<"A+"<"A-"<..: 13 7 7 16 14 5 14 16 7 9 ...
[72] df$Outlook_factor <- factor(df$Outlook)
str(df$Outlook_factor)
Factor w/ 3 levels "Negative","Positive",..: 3 3 3 2 3 1 3 2 3 3 ...
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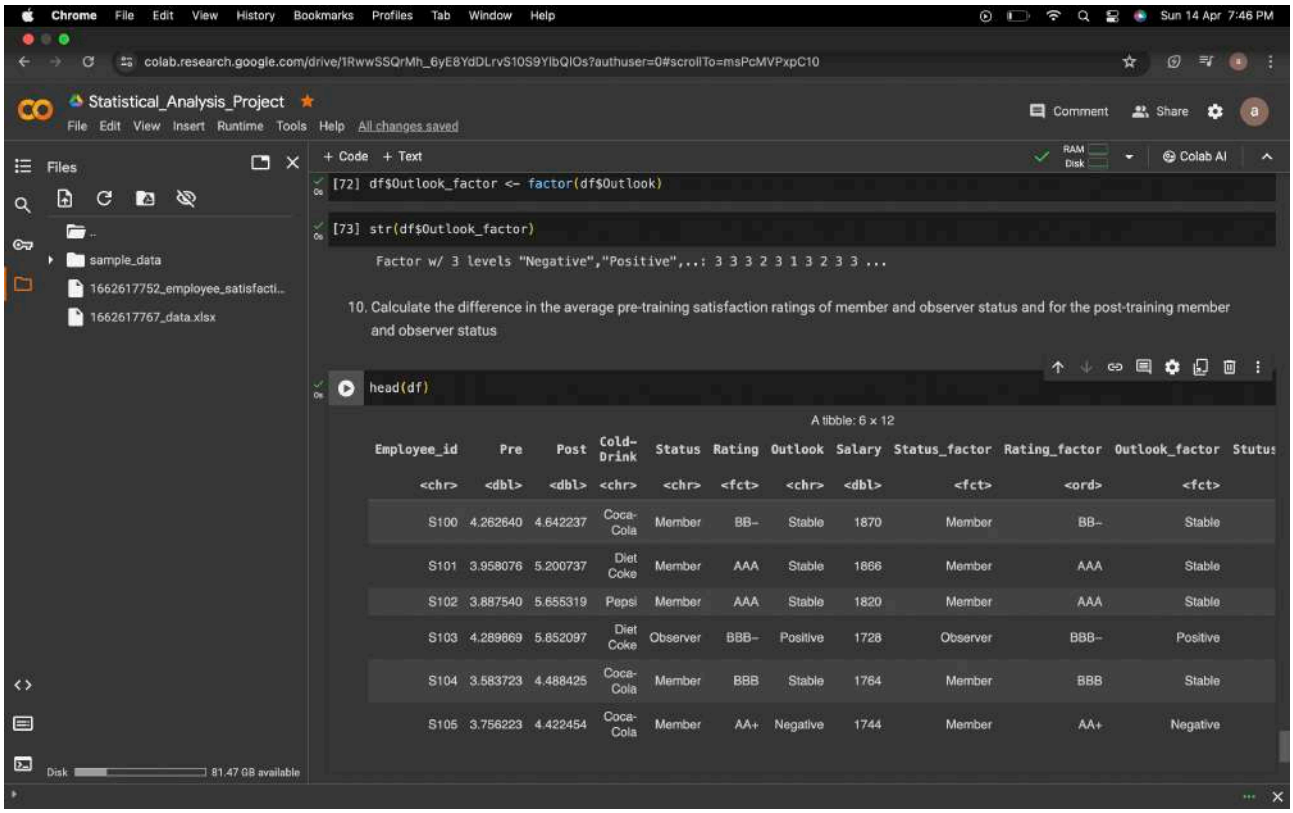
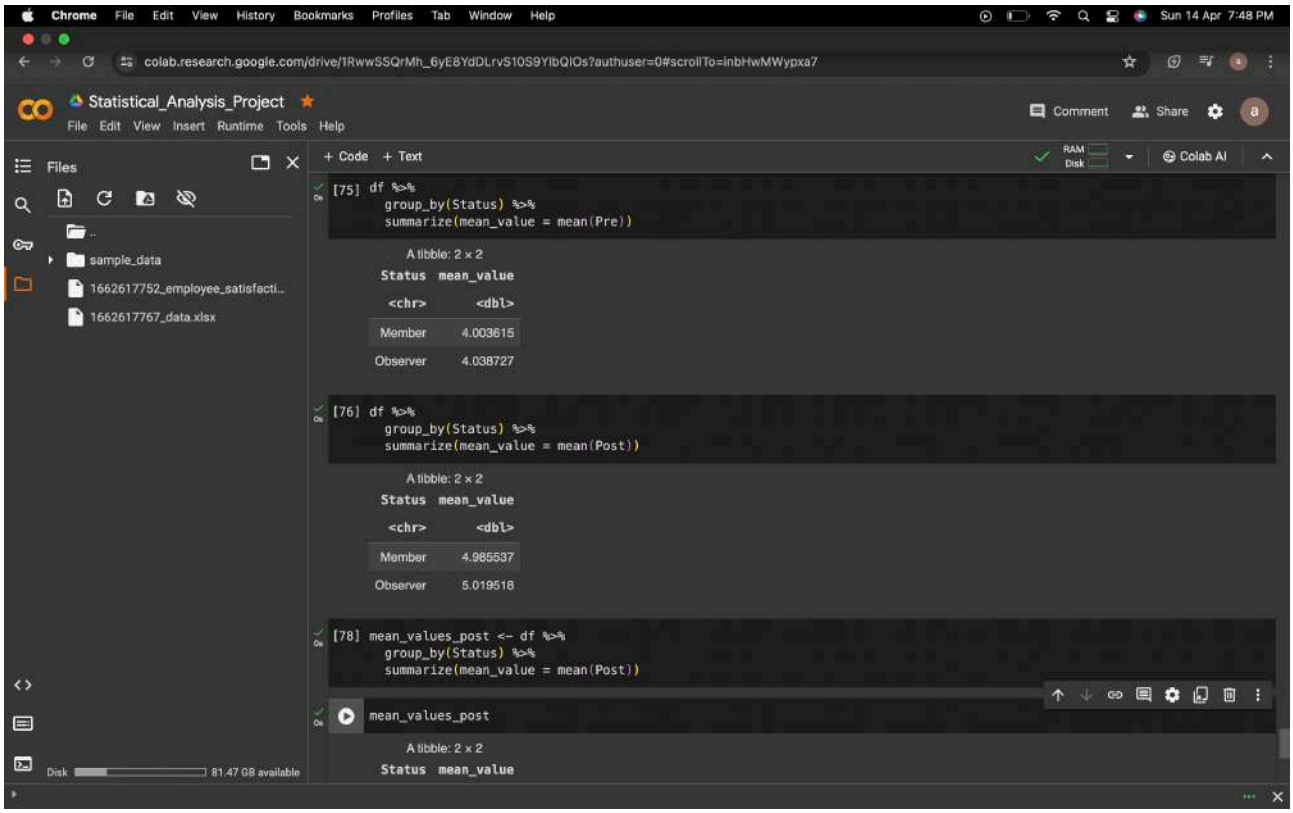
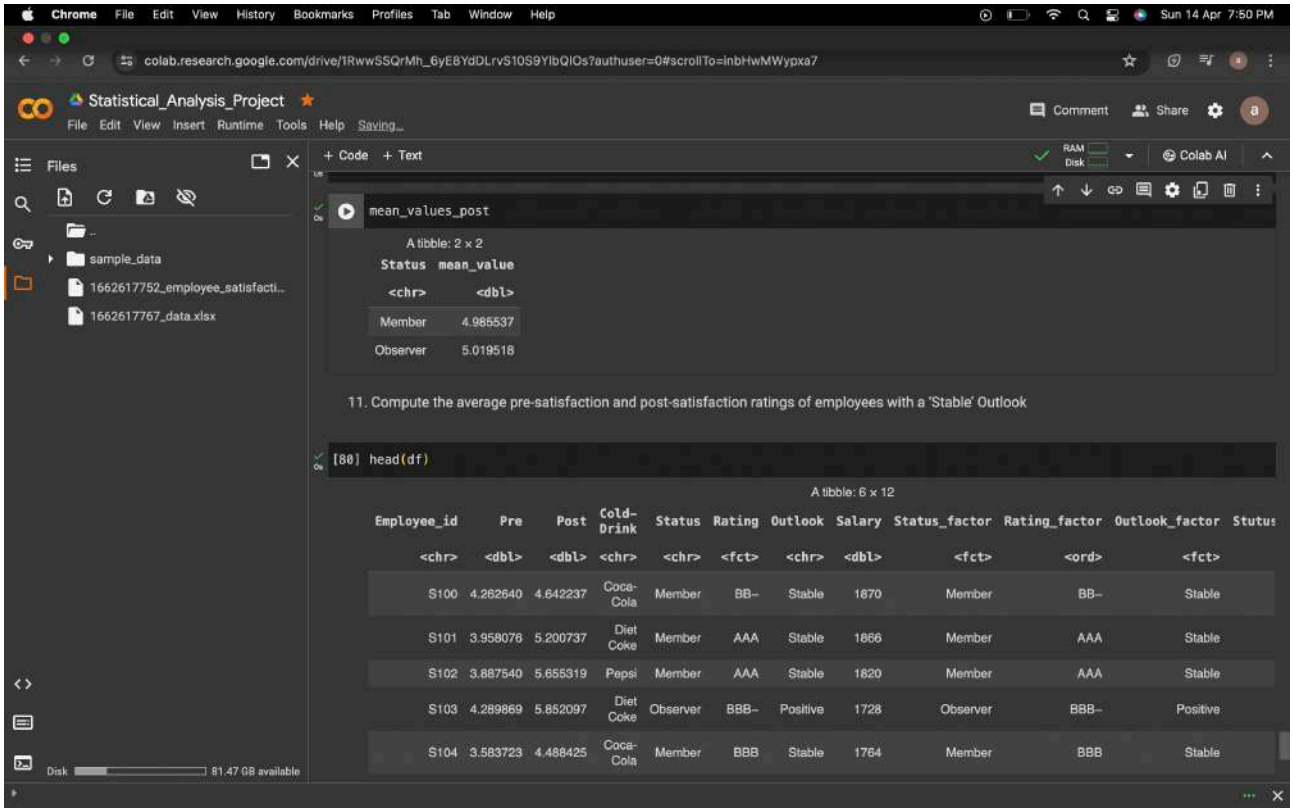
10. Calculate the difference in the average pre-training satisfaction ratings of member and observer status and for the post-training member and observer status



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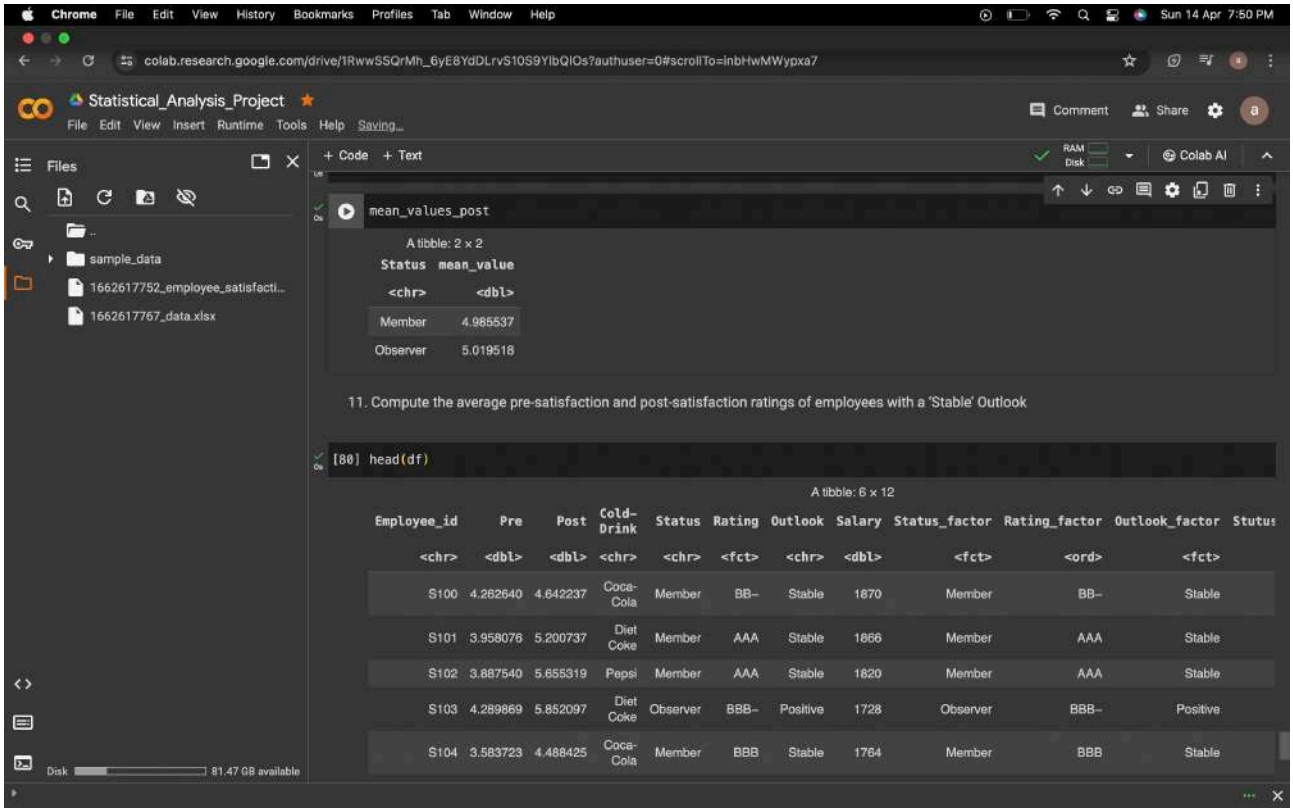
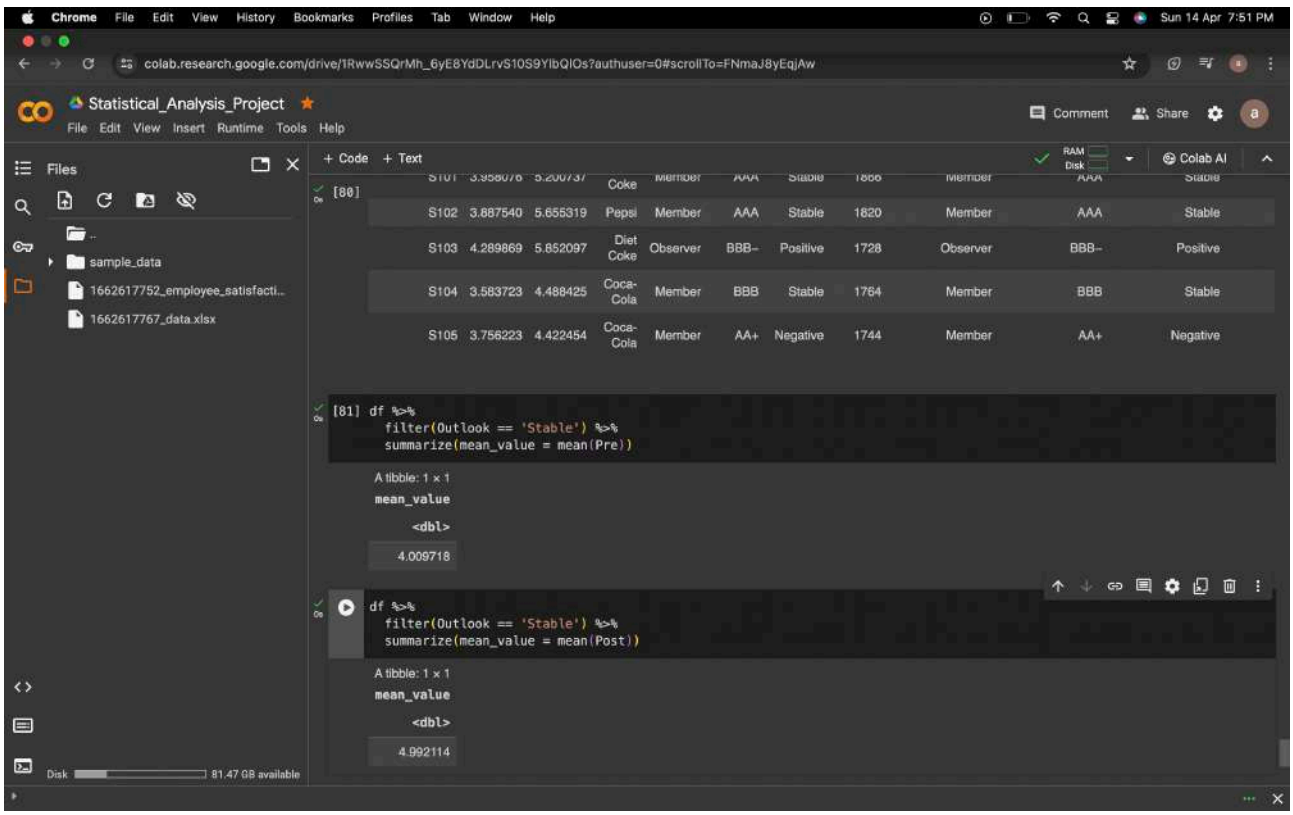
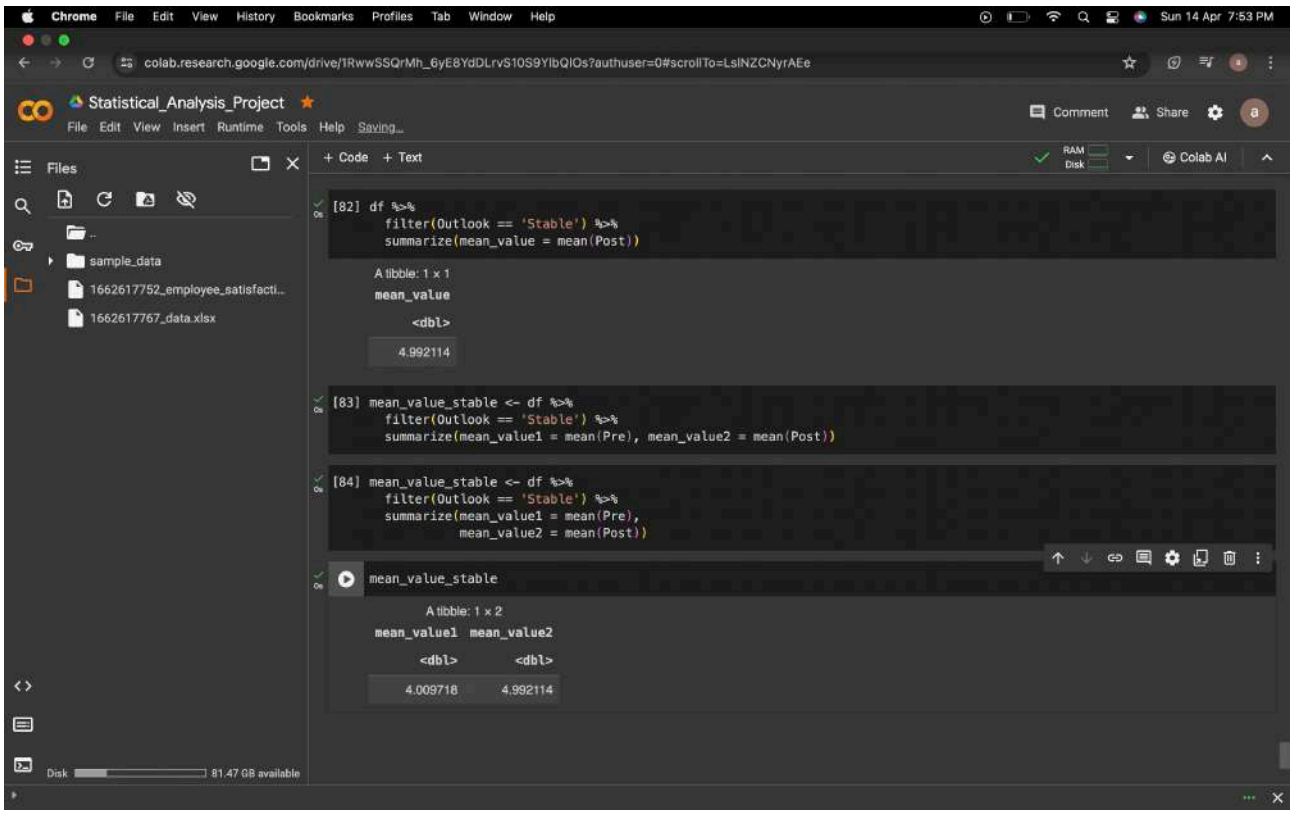
Share
Files
sample_data
1662617752_employee_satisfacti...
1662617767_data.xlsx
Disk 81.47 GB available
+ Code + Text
RAM
Disk
Colab AI
mean_values_post
A tibble: 2 x 2
Status mean_value
<chr> <dbl>
Member 4.985537
Observer 5.019518
11. Compute the average pre-satisfaction and post-satisfaction ratings of employees with a 'Stable' Outlook
[80] head(df)
A tibble: 6 x 12
Employee_id Pre Post Cold-Drink Status Rating Outlook Salary Status_factor Rating_factor Outlook_factor Stutus
<chr> <dbl> <dbl> <chr> <chr> <fct> <chr> <dbl> <fct> <ord> <fct>
S100 4.262640 4.642237 Coca-Cola Member BB- Stable 1870 Member BB- Stable
S101 3.958076 5.200737 Diet Coke Member AAA Stable 1866 Member AAA Stable
S102 3.887540 5.655319 Pepsi Member AAA Stable 1820 Member AAA Stable
S103 4.289869 5.852097 Diet Coke Observer BBB- Positive 1728 Observer BBB- Positive
S104 3.583723 4.488425 Coca-Cola Member BBB Stable 1764 Member BBB Stable

11. Compute the average pre-satisfaction and post-satisfaction ratings of employees with a ‘Stable’ Outlook



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Comment
Share
Files
+ Code + Text
RAM
Disk
Colab AI
sample_data
1662617752_employee_satisfacti...
1662617767_data.xlsx
[82] df %>%
filter(Outlook == 'Stable') %>%
summarize(mean_value = mean(Post))
A tibble: 1 x 1
mean_value
<dbl>
4.992114
[83] mean_value_stable <- df %>%
filter(Outlook == 'Stable') %>%
summarize(mean_value1 = mean(Pre), mean_value2 = mean(Post))
[84] mean_value_stable <- df %>%
filter(Outlook == 'Stable') %>%
summarize(mean_value1 = mean(Pre),
mean_value2 = mean(Post))
mean_value_stable
A tibble: 1 x 2
mean_value1 mean_value2
<dbl> <dbl>
4.009718 4.992114
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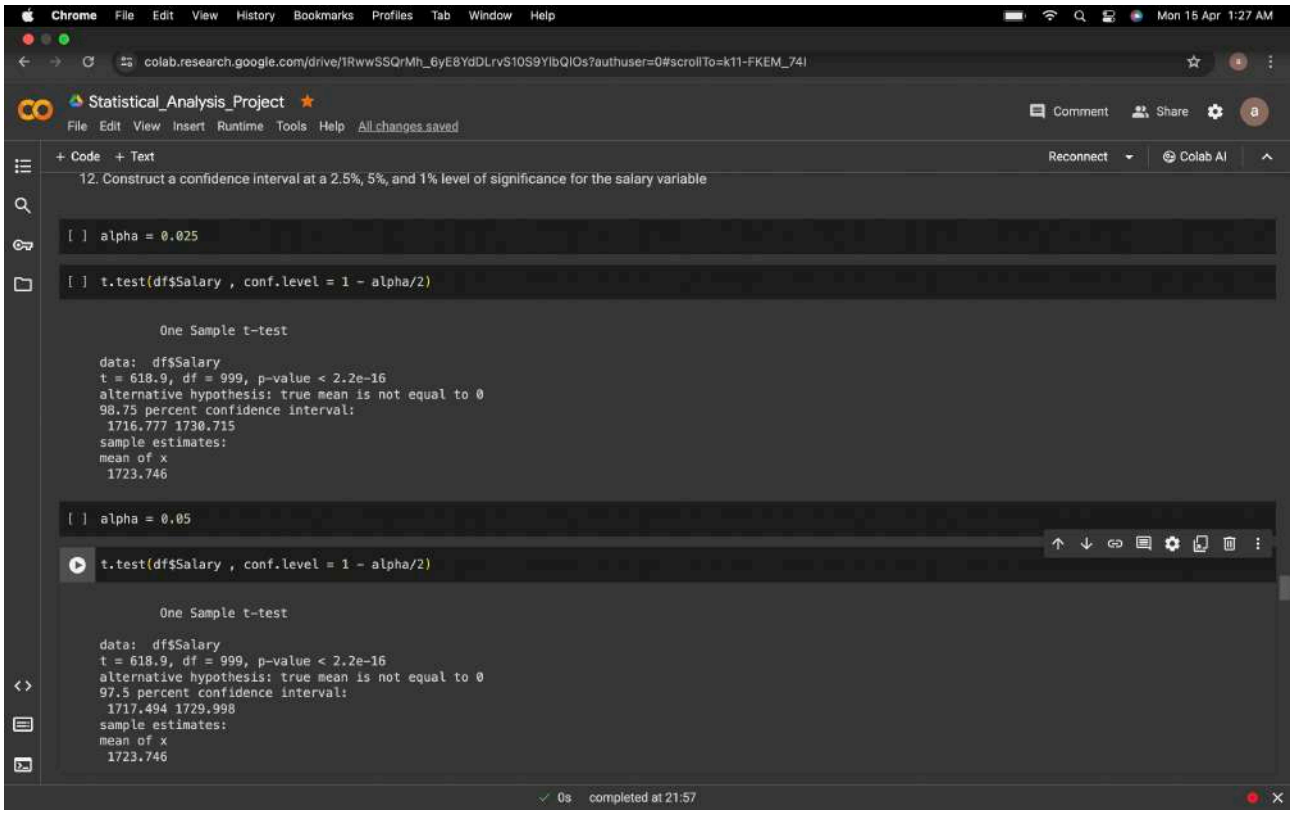
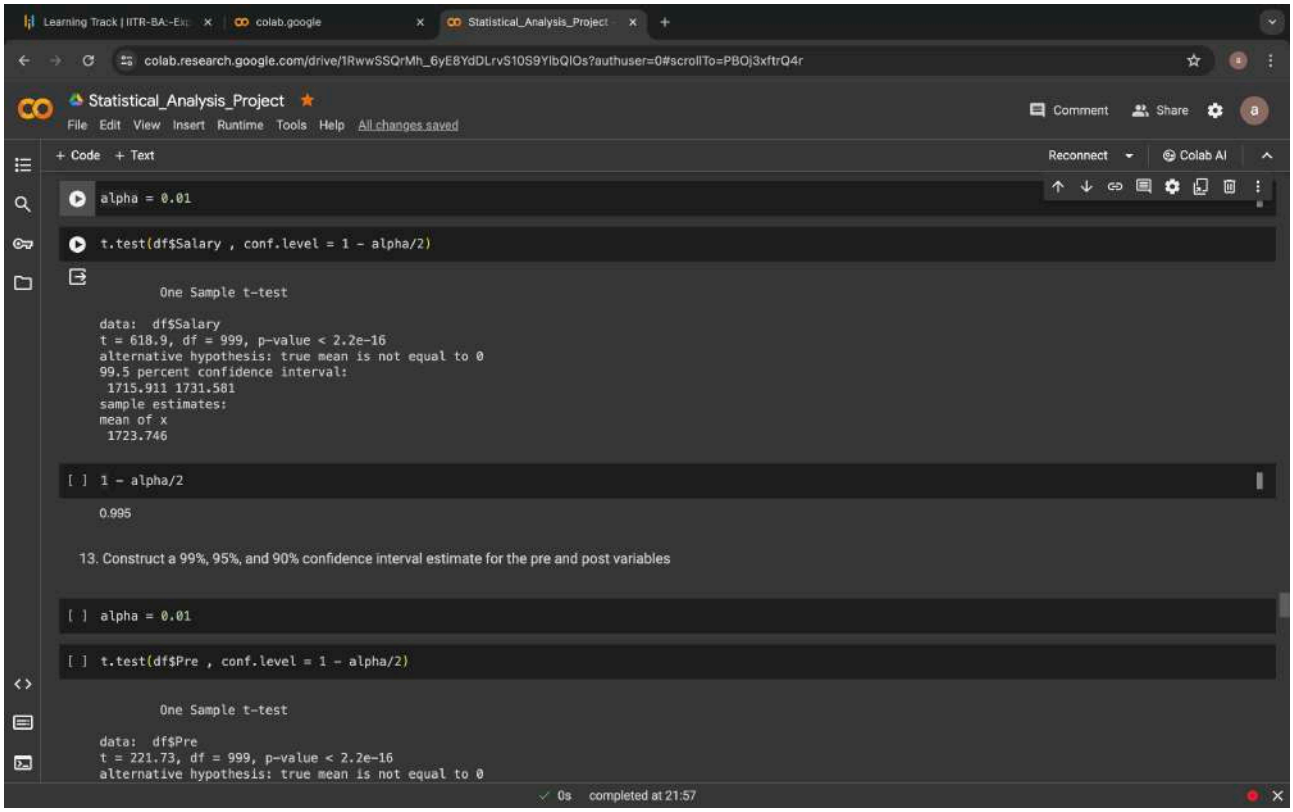
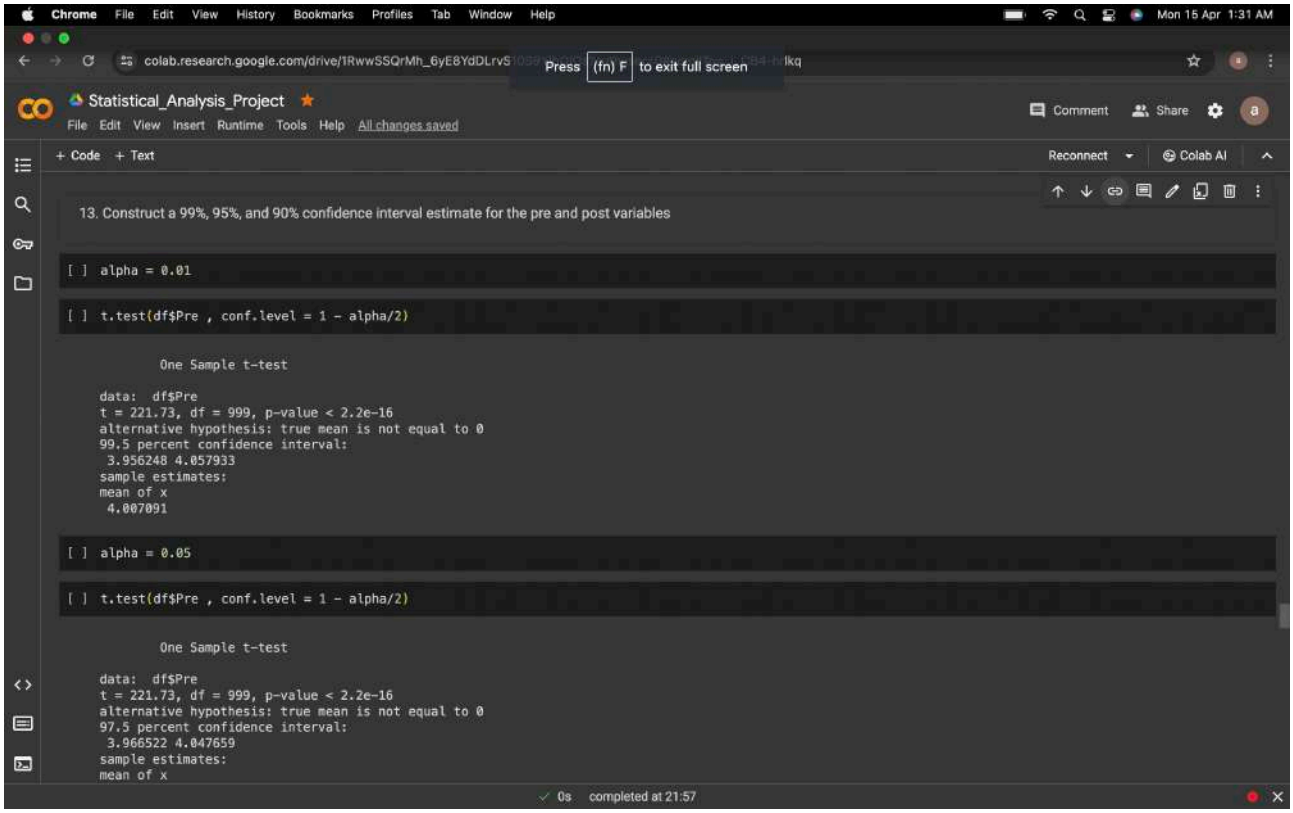
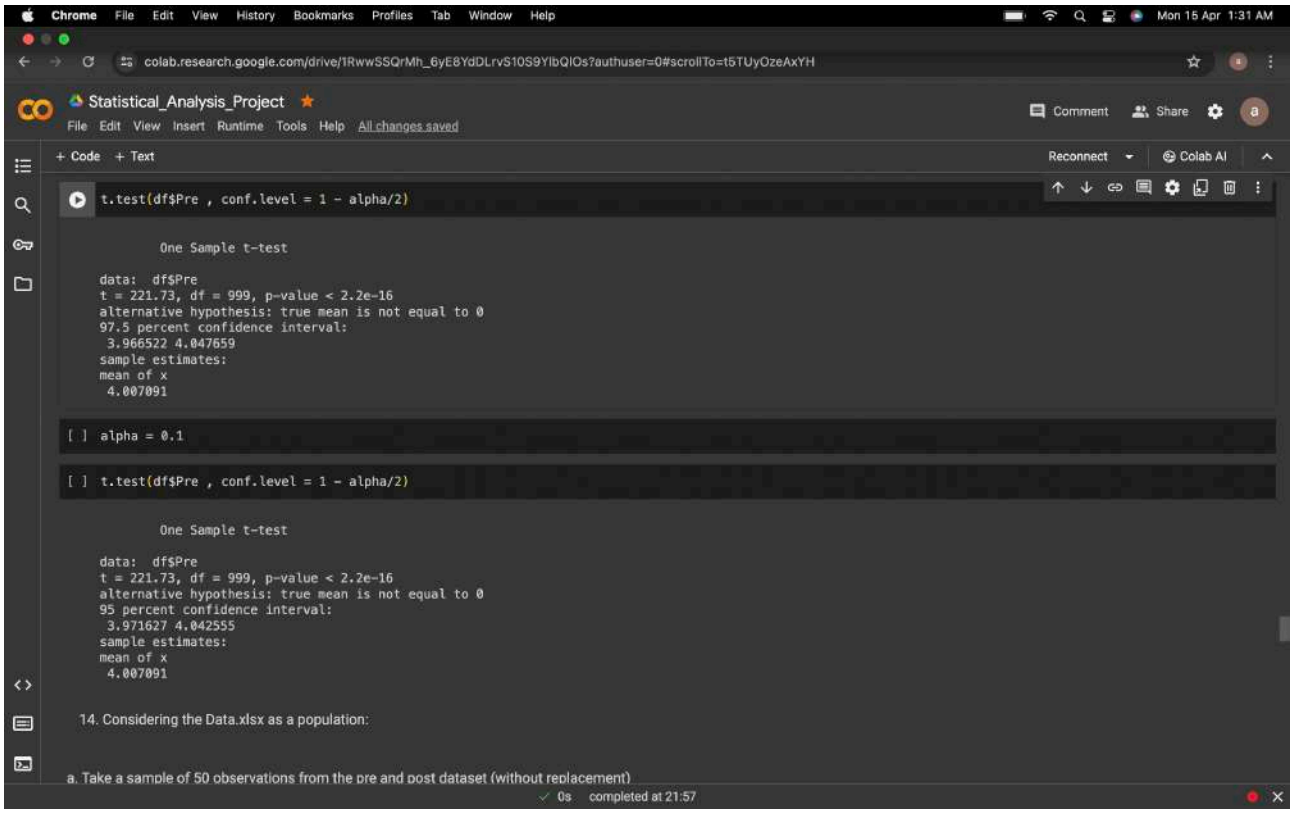
12. Construct a confidence interval at a 2.5%, 5%, and 1% level of significance for the salary variable

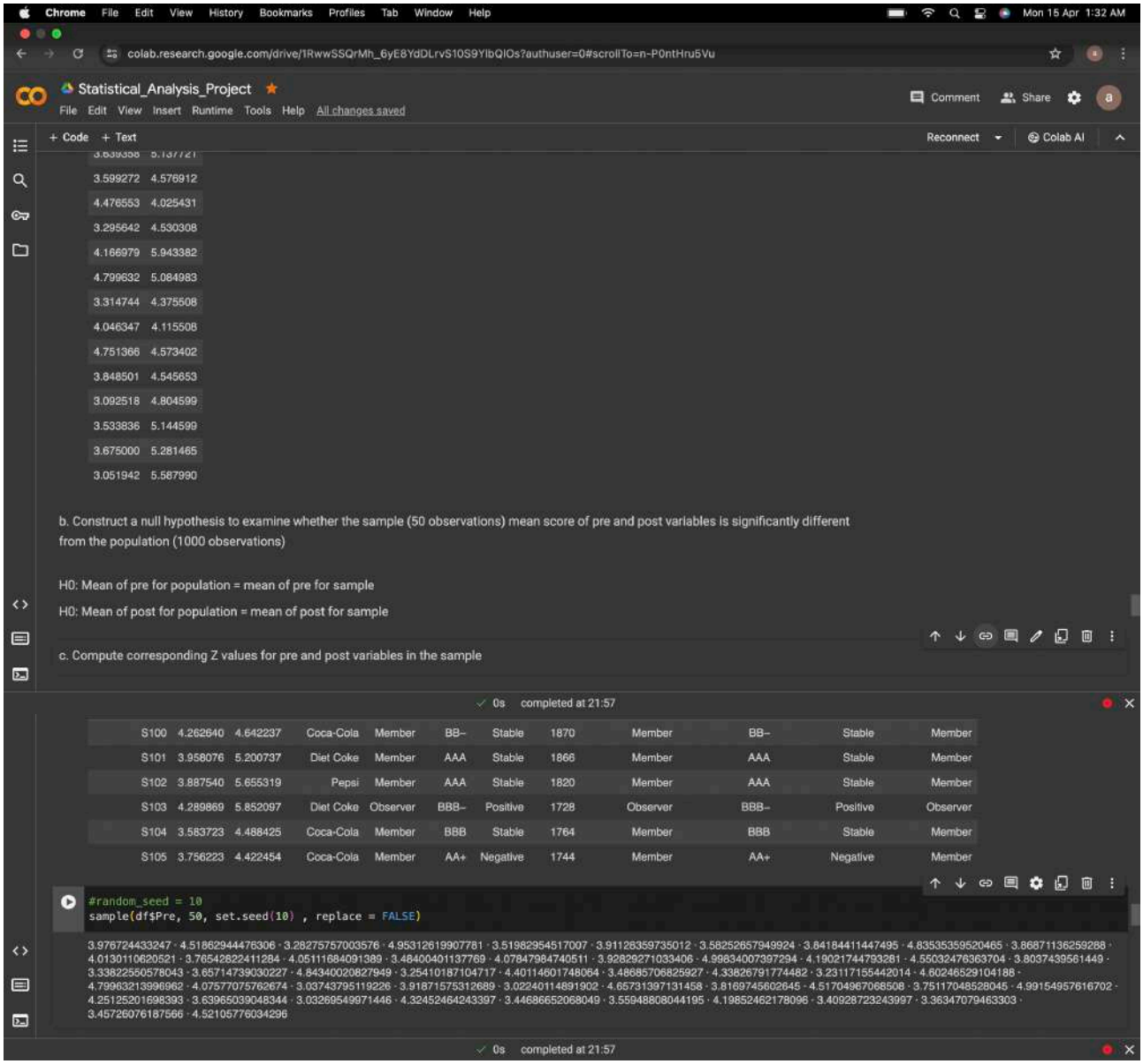




13. Construct a 99%, 95%, and 90% confidence interval estimate for the pre and post variables



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4.166979 5.943382
4.799632 5.084983
3.314744 4.375508
4.046347 4.115508
4.751366 4.573402
3.848501 4.545653
3.092518 4.804599
3.533836 5.144599
3.675000 5.281465
3.051942 5.587990
b. Construct a null hypothesis to examine whether the sample (50 observations) mean score of pre and post variables is significantly different from the population (1000 observations)
H0: Mean of pre for population = mean of pre for sample
H0: Mean of post for population = mean of post for sample
c. Compute corresponding Z values for pre and post variables in the sample
0s completed at 21:57
S100 4.262640 4.642237 Coca-Cola Member BB– Stable 1870 Member BB– Stable Member
S101 3.958076 5.200737 Diet Coke Member AAA Stable 1866 Member AAA Stable Member
S102 3.887540 5.655319 Pepsi Member AAA Stable 1820 Member AAA Stable Member
S103 4.289869 5.852097 Diet Coke Observer BBB– Positive 1728 Observer BBB– Positive Observer
S104 3.583723 4.488425 Coca-Cola Member BBB Stable 1764 Member BBB Stable Member
S105 3.756223 4.422454 Coca-Cola Member AA+ Negative 1744 Member AA+ Negative Member
#random_seed = 10
sample(df$Pre, 50, set.seed(10) , replace = FALSE)
3.976724433247 · 4.51862944476306 · 3.28275757003576 · 4.95312619907781 · 3.51982954517007 · 3.91126359735012 · 3.58252657949924 · 3.84184411447495 · 4.83535359520465 · 3.86871136259288 · 4.0130110620521 · 3.76542822411284 · 4.05111684091389 · 3.48400401137769 · 4.07847984740511 · 3.92829271033406 · 4.99834007397294 · 4.19021744793281 · 4.55032476363704 · 3.8037439561449 · 3.33822550578043 · 3.65714739030227 · 4.84340020827949 · 3.25410187104717 · 4.40114601748064 · 3.48685706825927 · 4.33826791774482 · 3.23117155442014 · 4.60246529104188 · 4.79963213996962 · 4.07577075762674 · 3.03743795119226 · 3.91871575312689 · 3.02240114891902 · 4.65731397131458 · 3.8169745602645 · 4.51704967068508 · 3.75117048528045 · 4.99154957616702 · 4.25125201698393 · 3.63965039048344 · 3.03269549971446 · 4.32452464243397 · 3.44686652068049 · 3.55948808044195 · 4.19852462178096 · 3.40928723243997 · 3.36347079463303 · 3.45726076187566 · 4.52105776034296
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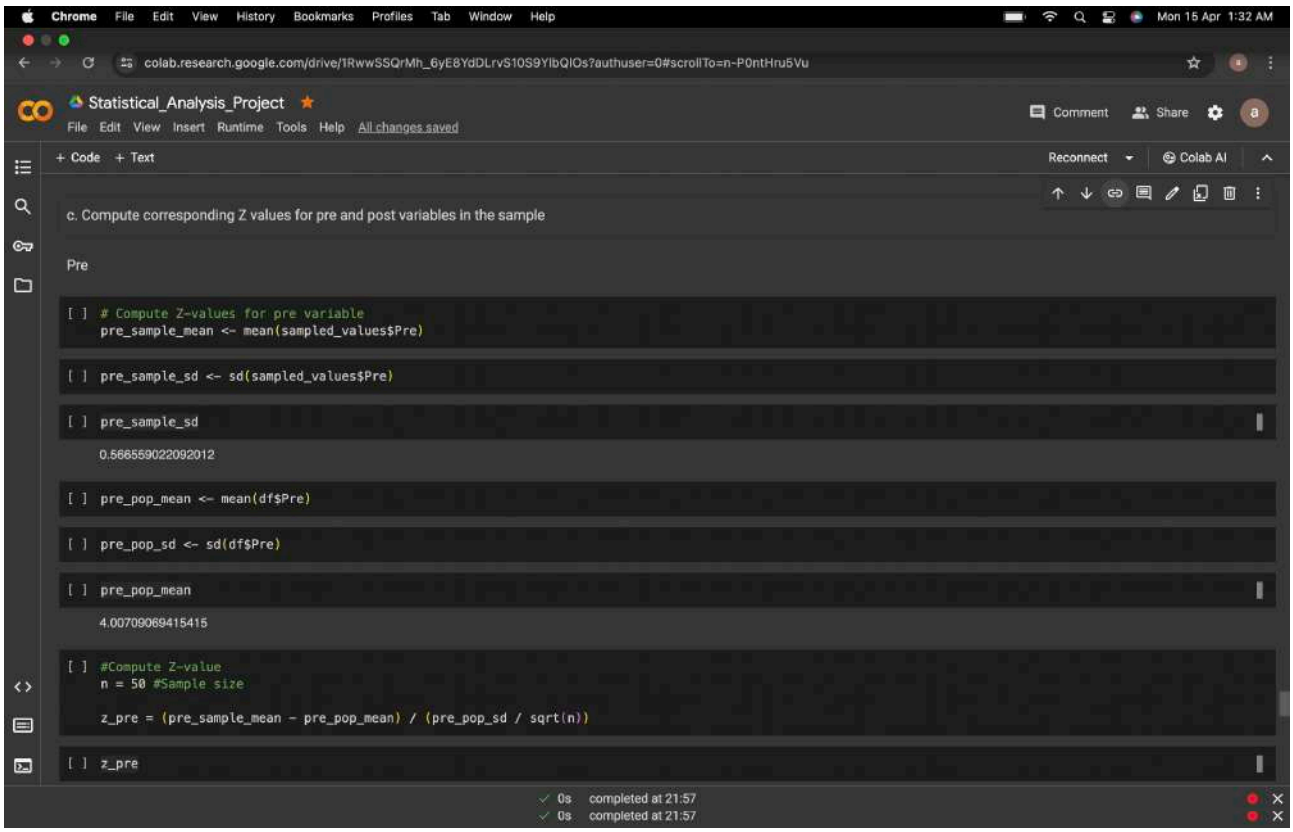
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c. Compute corresponding Z values for pre and post variables in the sample
Pre
# Compute Z-values for pre variable
pre_sample_mean <- mean(sampled_values$Pre)
pre_sample_sd <- sd(sampled_values$Pre)
pre_sample_sd
0.566559022092012
pre_pop_mean <- mean(df$Pre)
pre_pop_sd <- sd(df$Pre)
pre_pop_mean
4.00709069415415
#Compute Z-value
n = 50 #Sample size
z_pre = (pre_sample_mean - pre_pop_mean) / (pre_pop_sd / sqrt(n))
z_pre
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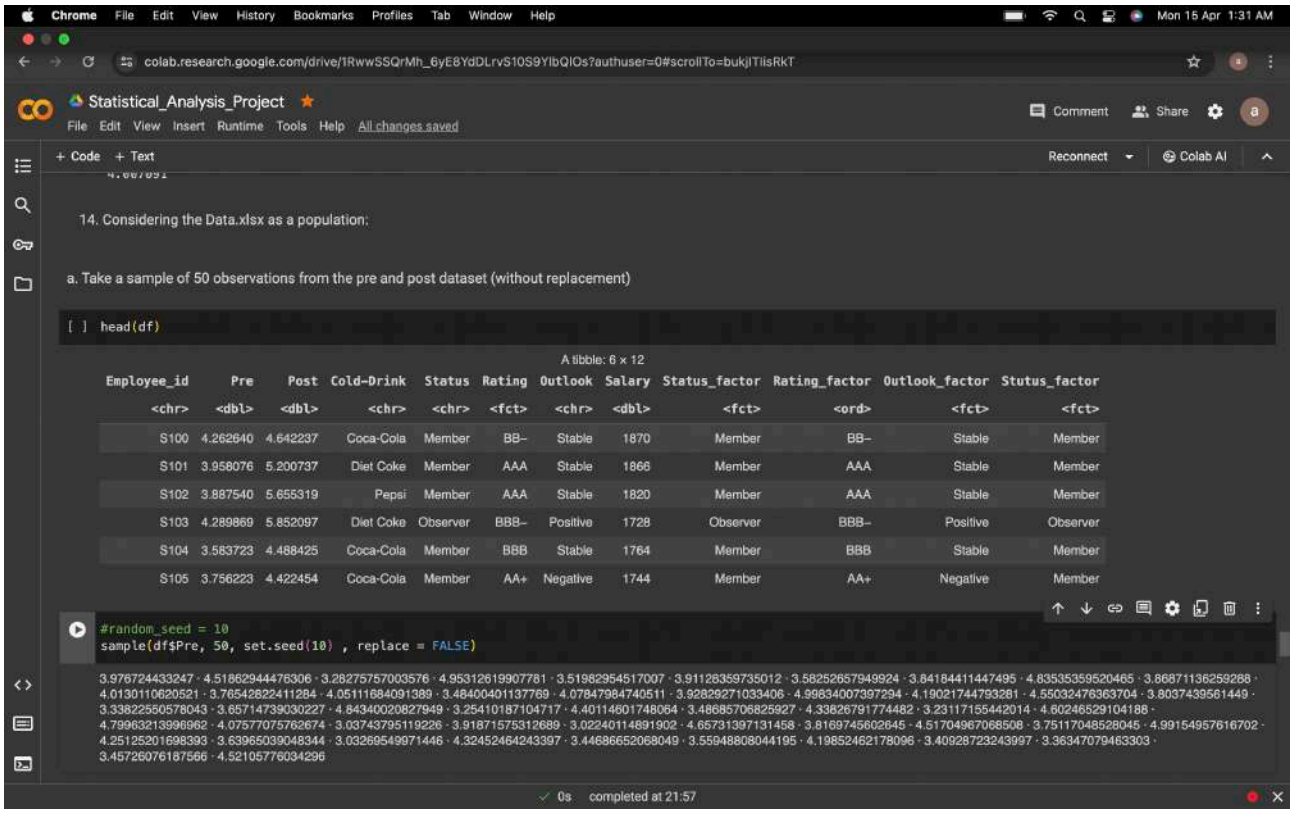
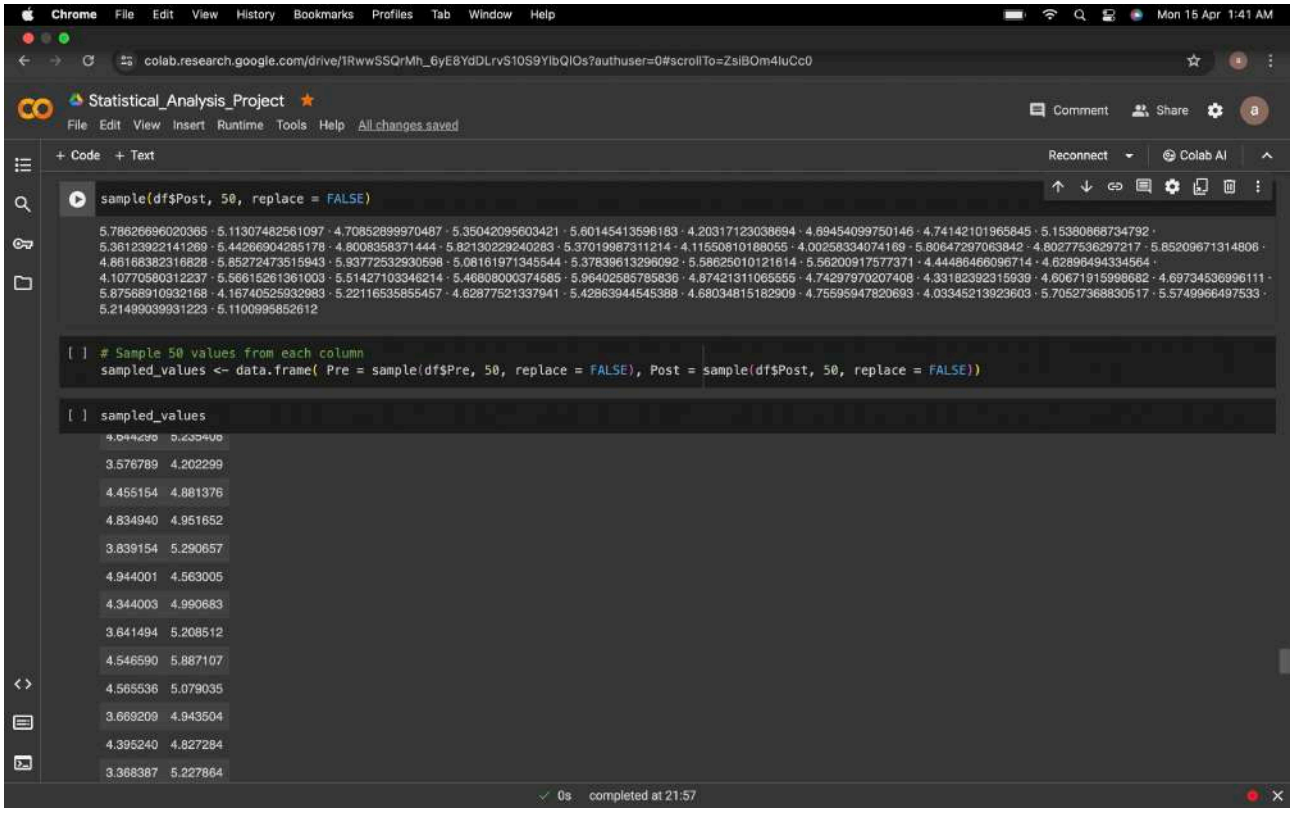
14. Considering the Data.xlsx as a population:

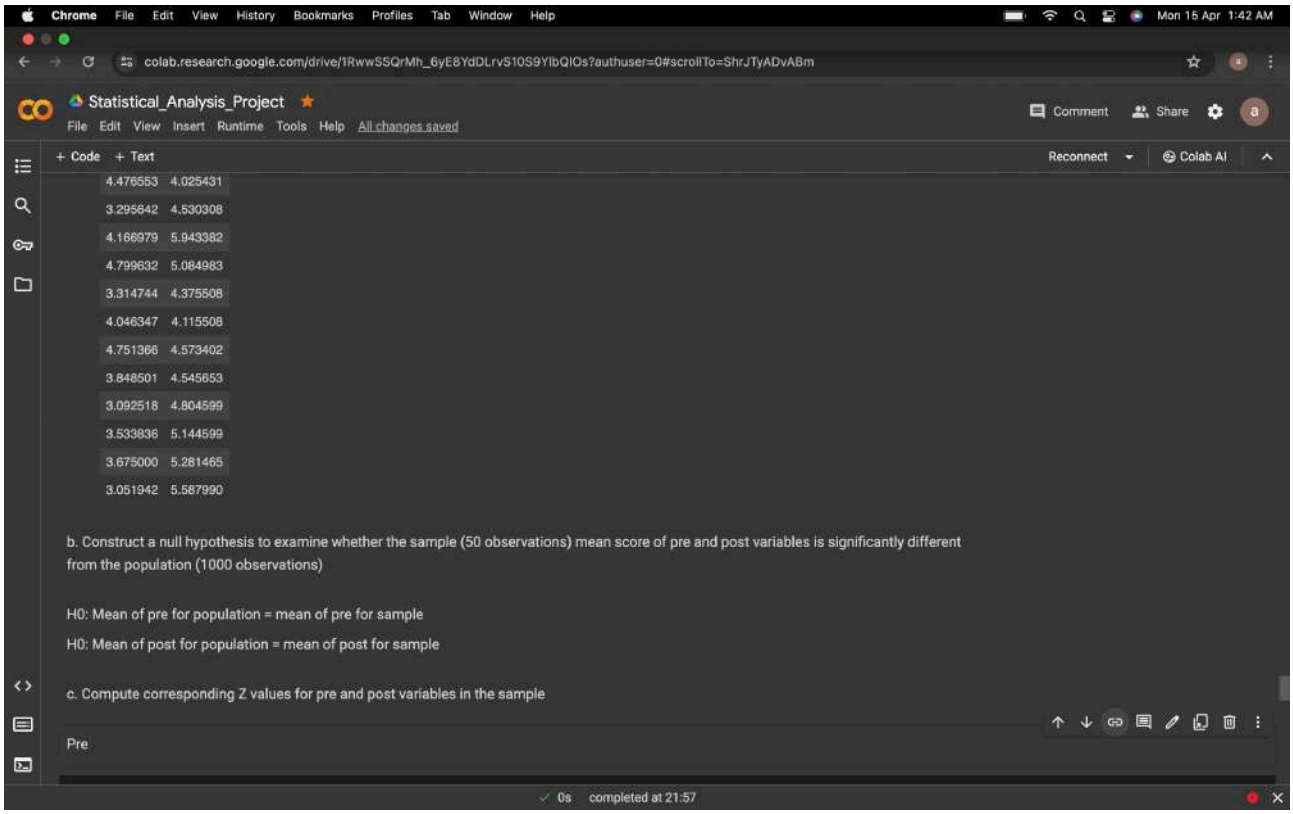
    a. Take a sample of 50 observations from the pre and post dataset (without replacement)

    b. Construct a null hypothesis to examine whether the sample (50 observations) mean score of pre and post variables is significantly different from the population (1000 observations)

    c. Compute corresponding Z values for pre and post variables in the sample



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3.314744 4.375508
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3.533836 5.144599
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Pre
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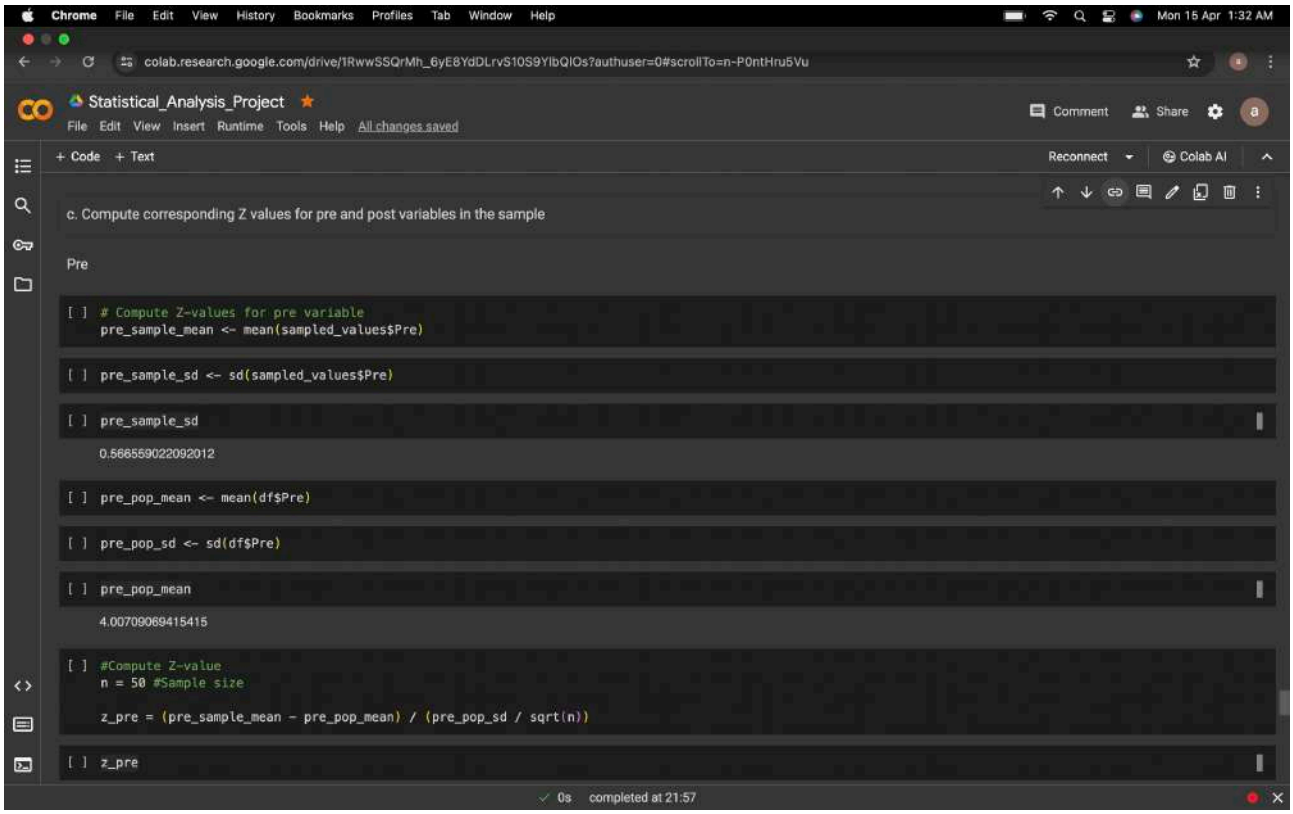
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c. Compute corresponding Z values for pre and post variables in the sample
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pre_sample_sd <- sd(sampled_values$Pre)
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0.566559022092012
pre_pop_mean <- mean(df$Pre)
pre_pop_sd <- sd(df$Pre)
pre_pop_mean
4.00709069415415
#Compute Z-value
n = 50 #Sample size
z_pre = (pre_sample_mean - pre_pop_mean) / (pre_pop_sd / sqrt(n))
z_pre
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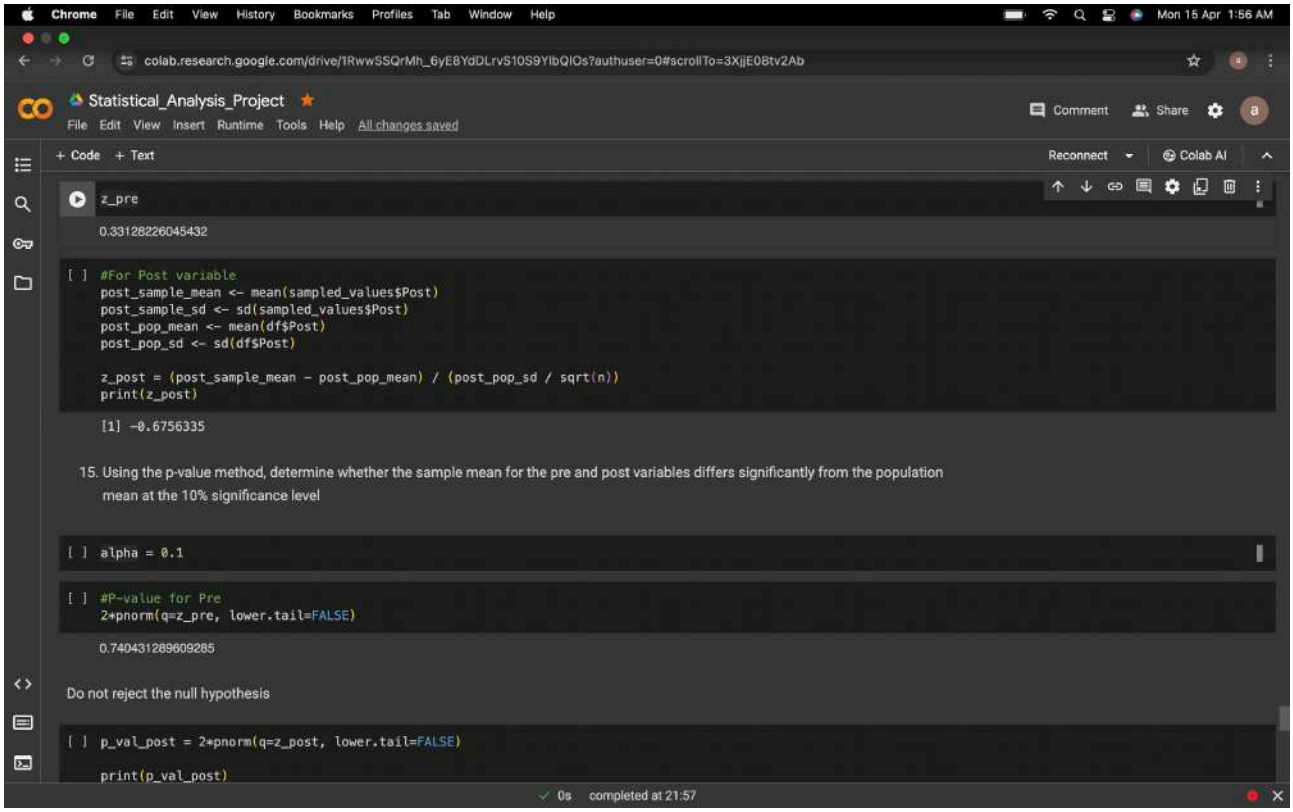
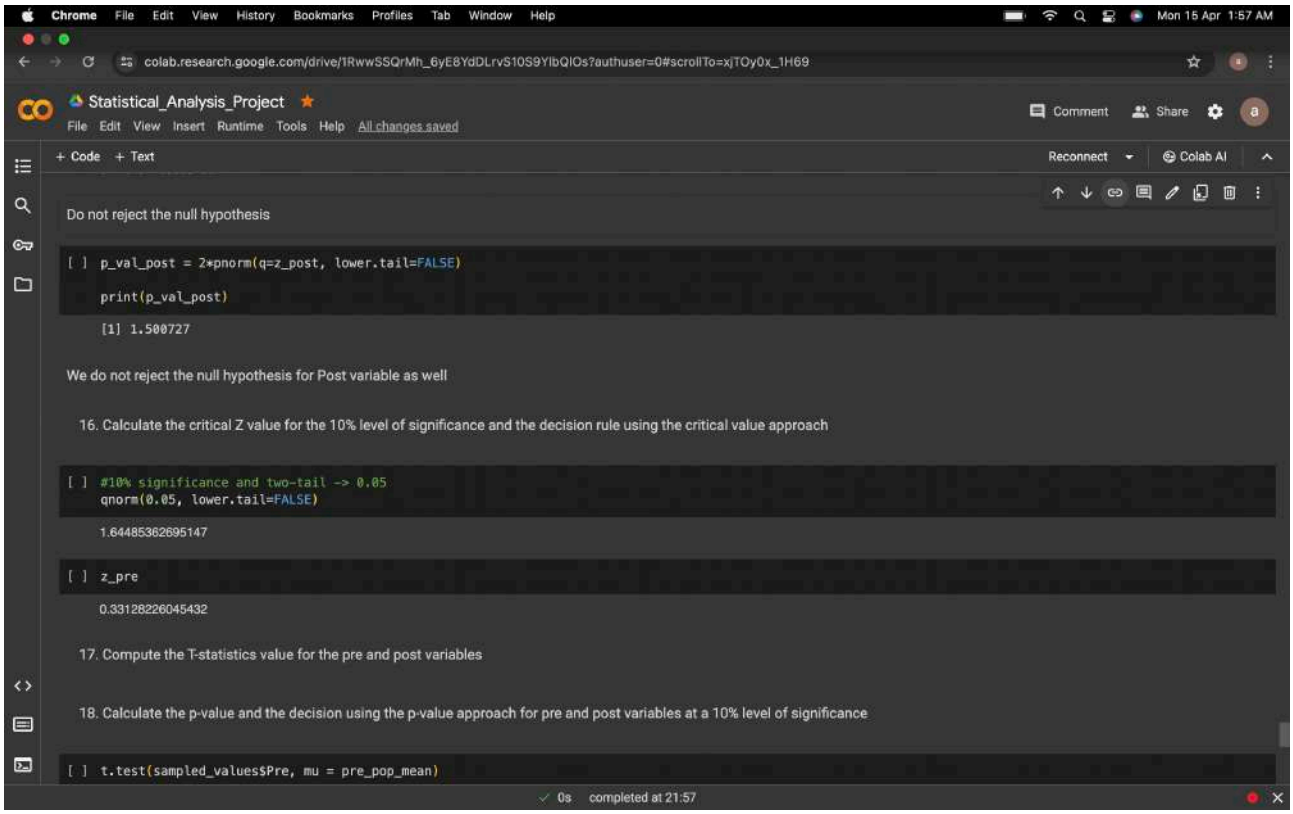


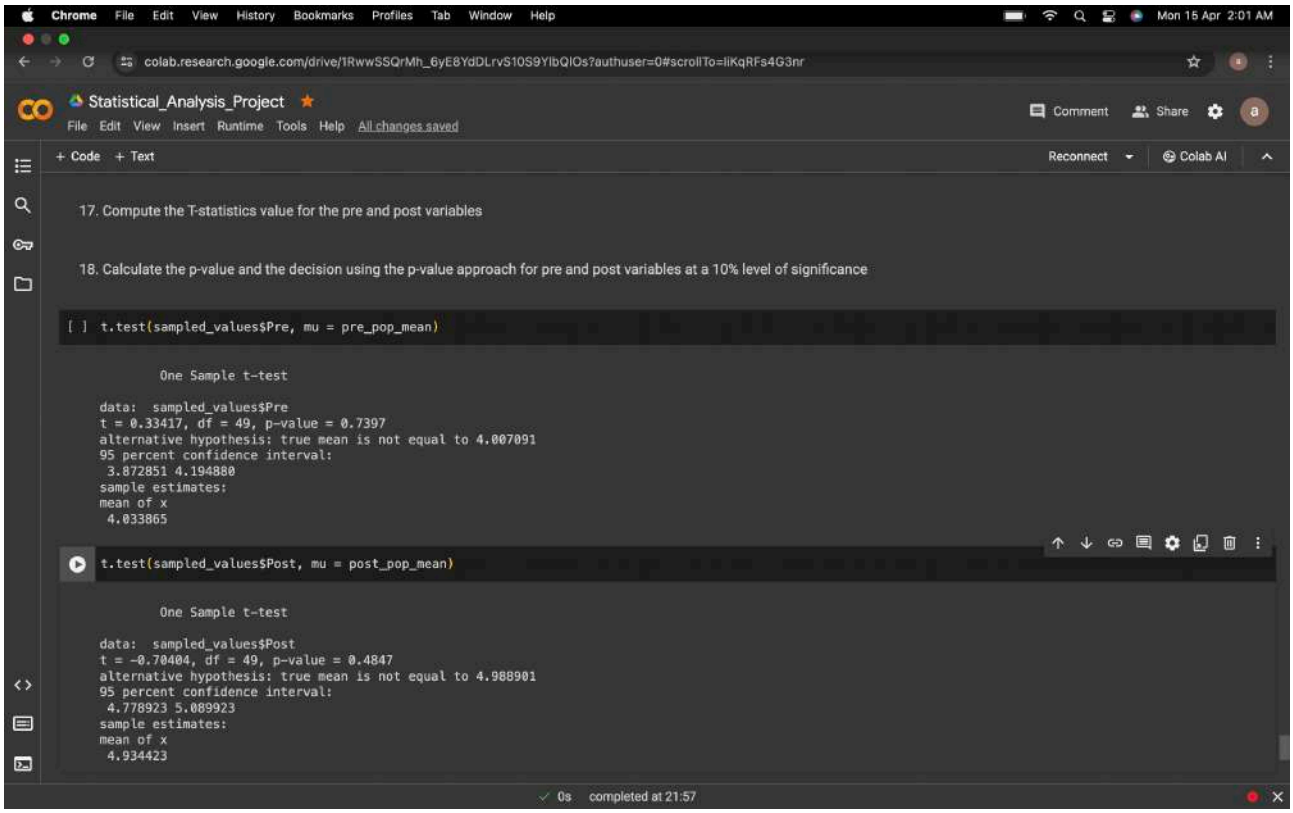
15. Using the p-value method, determine whether the sample mean for the pre and post variables differs significantly from the population mean at the 10% significance level



16. Calculate the critical Z value for the 10% level of significance and the decision rule using the critical value approach

17. Compute the T-statistics value for the pre and post variables

18. Calculate the p-value and the decision using the p-value approach for pre and post variables at a 10% level of significance



19. Calculate the critical T value for the level of significance of 10% and the decision rule using the critical value approach