

Practical No 6 Module II

Aim : Performing paired t-tests using `t.test(paired=TRUE)` (R).

Output :

The screenshot shows the RStudio interface with the following content:

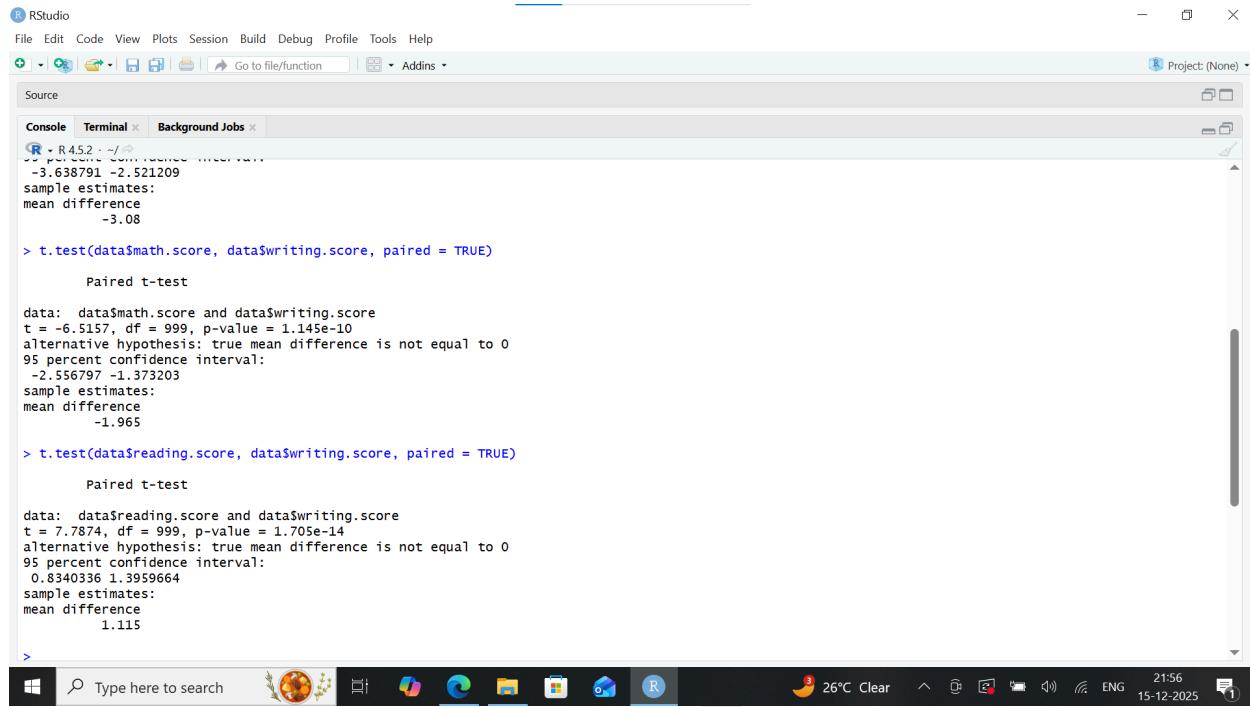
```
R - R 4.5.2 · ~/R
> #install.packages("ggplot2")
> #install.packages("tidyverse")
>
> library(dplyr)
> library(ggplot2)
> library(tidyverse)
>
> data <- read.csv("StudentsPerformance.csv", stringsAsFactors = TRUE)
> head(data)
  gender race ethnicity parental.level.of.education      lunch test.preparation.course math.score reading.score writing.score
1 female   group B        bachelor's degree    standard       none      72        72        74
2 female   group C        some college      standard completed     69        90        88
3 female   group B        master's degree    standard       none      90        95        93
4 male     group A        associate's degree free/reduced   none      47        57        44
5 male     group C        some college      standard       none      76        78        75
6 female   group B        associate's degree    standard       none      71        83        78
>
> # Paired t-tests
> t.test(data$math.score, data$reading.score, paired = TRUE)

Paired t-test

data: data$math.score and data$reading.score
t = -10.816, df = 999, p-value < 2.2e-16
alternative hypothesis: true mean difference is not equal to 0
95 percent confidence interval:
-35.638791 -2.521209
sample estimates:
mean difference
-3.08
```

The Windows taskbar at the bottom of the screen displays the following icons from left to right: Start button, Search bar, File Explorer, Edge browser, Task View, File Explorer, Task View, RStudio icon, Task View, Volume, Battery, Network, Language (ENG), Date and Time (15-12-2025), and a small notification icon.

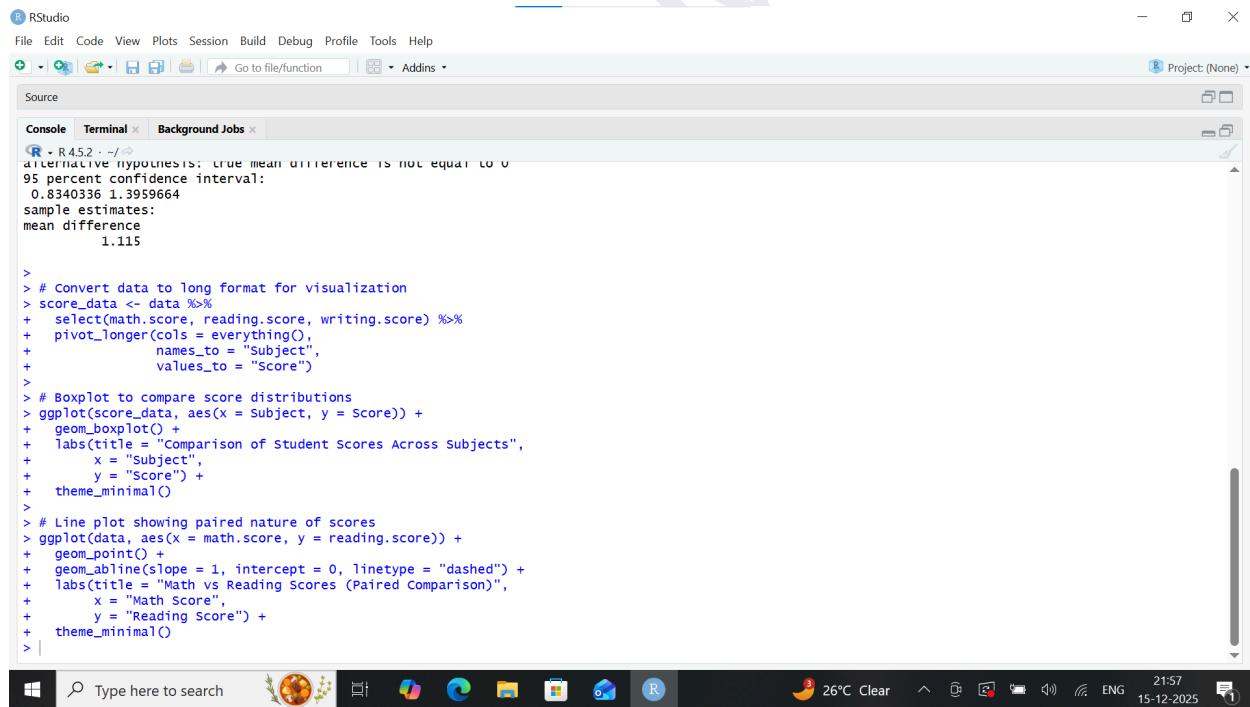
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SUBJECT : R Programming



RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
Source
Console Terminal Background Jobs
R 4.5.2 -> sample estimates:
mean difference
-3.08

> t.test(data\$math.score, data\$writing.score, paired = TRUE)
Paired t-test
data: data\$math.score and data\$writing.score
t = -6.5157, df = 999, p-value = 1.145e-10
alternative hypothesis: true mean difference is not equal to 0
95 percent confidence interval:
-2.556797 -1.373203
sample estimates:
mean difference
-1.965

> t.test(data\$reading.score, data\$writing.score, paired = TRUE)
Paired t-test
data: data\$reading.score and data\$writing.score
t = 7.7874, df = 999, p-value = 1.705e-14
alternative hypothesis: true mean difference is not equal to 0
95 percent confidence interval:
0.8340336 1.3959664
sample estimates:
mean difference
1.115
>



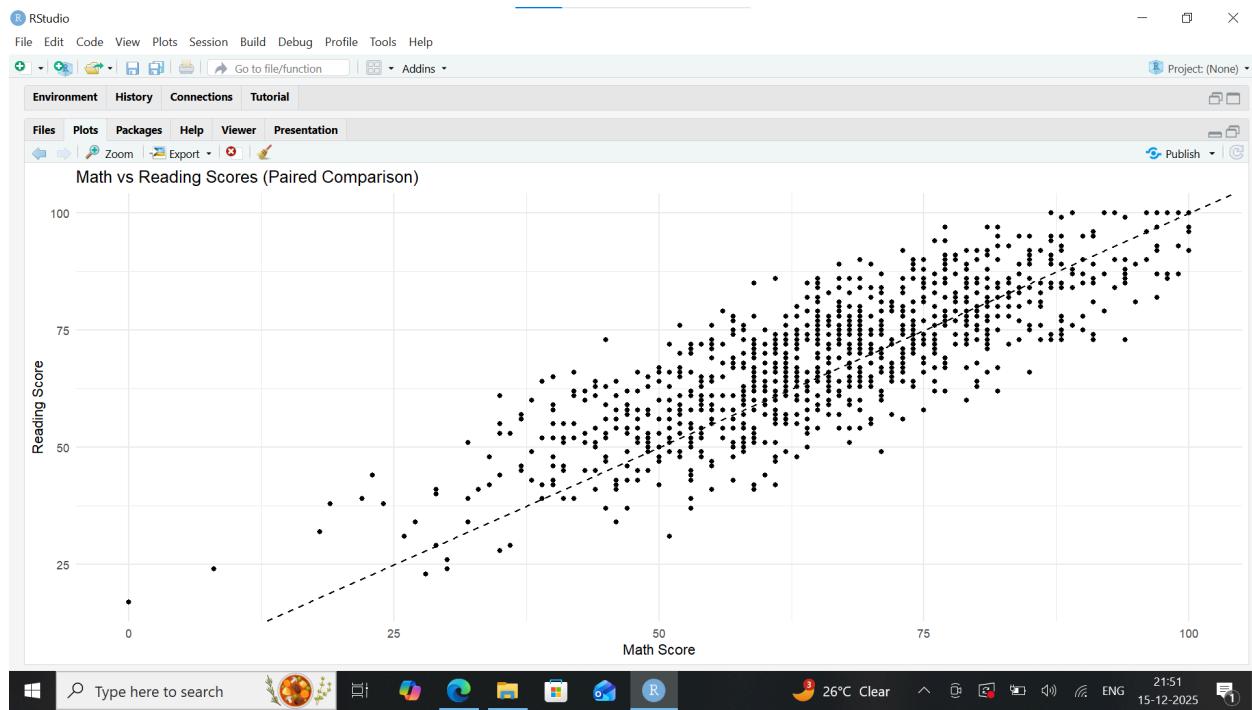
RStudio
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R 4.5.2 ->
alternative hypothesis: true mean difference is not equal to 0
95 percent confidence interval:
0.8340336 1.3959664
sample estimates:
mean difference
1.115

> # Convert data to long format for visualization
> score_data <- data %>%
+ select(math.score, reading.score, writing.score) %>%
+ pivot_longer(cols = everything(),
+ names_to = "Subject",
+ values_to = "Score")
+
> # Boxplot to compare score distributions
> ggplot(score_data, aes(x = Subject, y = Score)) +
+ geom_boxplot() +
+ labs(title = "Comparison of Student Scores Across Subjects",
+ x = "Subject",
+ y = "Score") +
+ theme_minimal()
+
> # Line plot showing paired nature of scores
> ggplot(data, aes(x = math.score, y = reading.score)) +
+ geom_point() +
+ geom_abline(slope = 1, intercept = 0, linetype = "dashed") +
+ labs(title = "Math vs Reading Scores (Paired Comparison)",
+ x = "Math Score",
+ y = "Reading Score") +
+ theme_minimal()
>

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