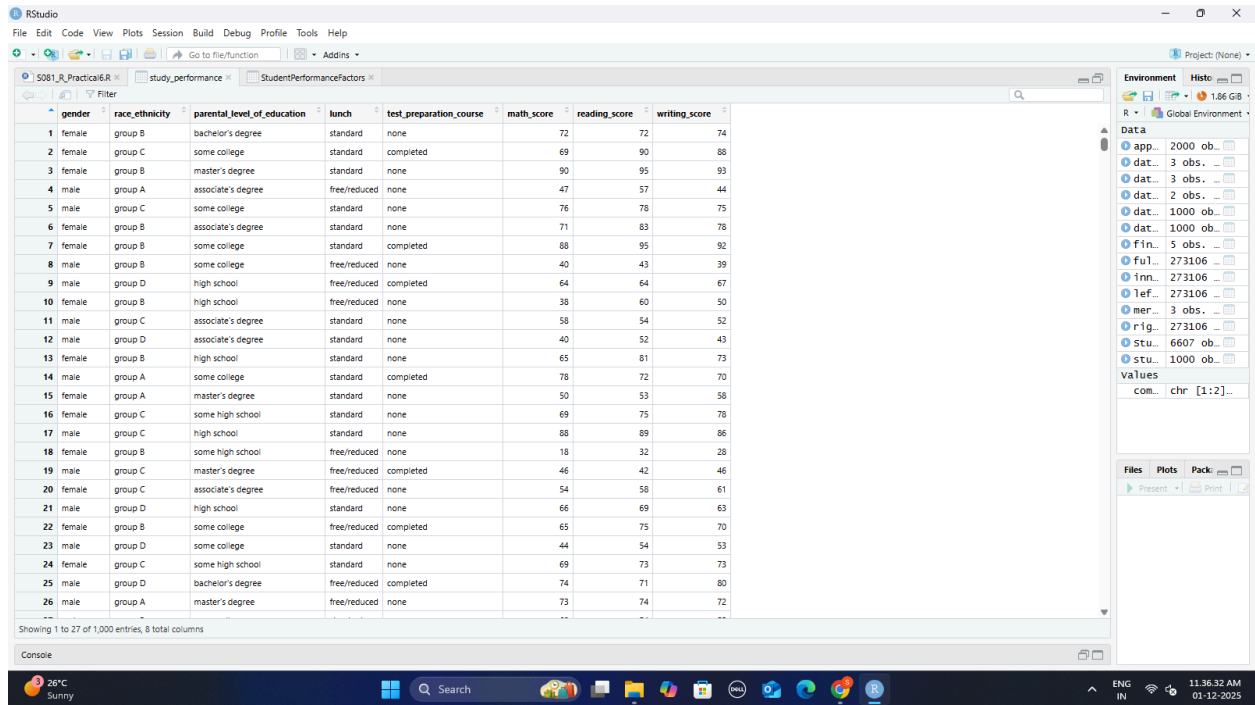


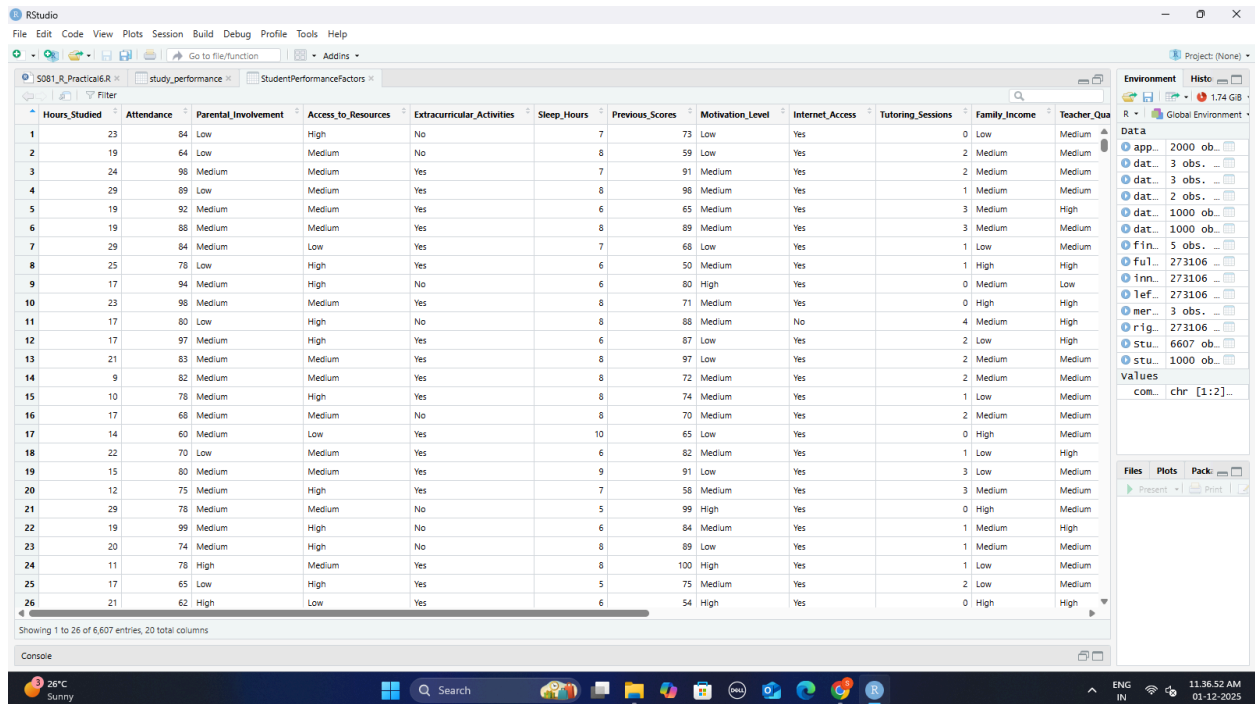
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## 6. Combining and appending datasets using merge() or bind\_rows() in R.



The screenshot shows the RStudio interface with a dataset loaded. The dataset has 26 rows and 8 columns. The columns are: gender, race\_ethnicity, parental\_level\_of\_education, lunch, test\_preparation\_course, math\_score, reading\_score, and writing\_score. The data is displayed in a table format.

	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
7	female	group B	some college	standard	completed	88	95	92
8	male	group B	some college	free/reduced	none	40	43	39
9	male	group D	high school	free/reduced	completed	64	64	67
10	female	group B	high school	free/reduced	none	38	60	50
11	male	group C	associate's degree	standard	none	58	54	52
12	male	group D	associate's degree	standard	none	40	52	43
13	female	group B	high school	standard	none	65	81	73
14	male	group A	some college	standard	completed	78	72	70
15	female	group A	master's degree	standard	none	50	53	58
16	female	group C	some high school	standard	none	69	75	78
17	male	group C	high school	standard	none	88	89	86
18	female	group B	some high school	free/reduced	none	18	32	28
19	male	group C	master's degree	free/reduced	completed	46	42	46
20	female	group C	associate's degree	free/reduced	none	54	58	61
21	male	group D	high school	standard	none	66	69	63
22	female	group B	some college	free/reduced	completed	65	75	70
23	male	group D	some college	standard	none	44	54	53
24	female	group C	some high school	standard	none	69	73	73
25	male	group D	bachelor's degree	free/reduced	completed	74	71	80
26	male	group A	master's degree	free/reduced	none	73	74	72



The screenshot shows the RStudio interface with a dataset loaded. The dataset has 26 rows and 13 columns. The columns are: Hours\_Studied, Attendance, Parental\_Involvement, Access\_to\_Resources, Extracurricular\_Activities, Sleep\_Hours, Previous\_Scores, Motivation\_Level, Internet\_Access, Tutoring\_Sessions, Family\_Income, and Teacher\_Quality. The data is displayed in a table format.

	Hours_Studied	Attendance	Parental_Involvement	Access_to_Resources	Extracurricular_Activities	Sleep_Hours	Previous_Scores	Motivation_Level	Internet_Access	Tutoring_Sessions	Family_Income	Teacher_Quality
1	23	84	Low	High	No	7	73	Low	Yes	0	Low	Medium
2	19	64	Low	Medium	No	8	59	Low	Yes	2	Medium	Medium
3	24	98	Medium	Medium	Yes	7	91	Medium	Yes	2	Medium	Medium
4	29	89	Low	Medium	Yes	8	98	Medium	Yes	1	Medium	Medium
5	19	92	Medium	Medium	Yes	6	65	Medium	Yes	3	Medium	High
6	19	88	Medium	Medium	Yes	8	89	Medium	Yes	3	Medium	Medium
7	29	84	Medium	Low	Yes	7	68	Low	Yes	1	Low	Medium
8	25	78	Low	High	Yes	6	50	Medium	Yes	1	High	High
9	17	94	Medium	High	No	6	80	High	Yes	0	Medium	Low
10	23	98	Medium	Medium	Yes	8	71	Medium	Yes	0	High	High
11	17	80	Low	High	No	8	88	Medium	No	4	Medium	High
12	17	97	Medium	High	Yes	6	87	Low	Yes	2	Low	High
13	21	83	Medium	Medium	Yes	8	97	Low	Yes	2	Medium	Medium
14	9	82	Medium	Medium	Yes	8	72	Medium	Yes	2	Medium	Medium
15	10	78	Medium	High	Yes	8	74	Medium	Yes	1	Low	Medium
16	17	68	Medium	Medium	No	8	70	Medium	Yes	2	Medium	Medium
17	14	60	Medium	Low	Yes	10	65	Low	Yes	0	High	Medium
18	22	70	Low	Medium	Yes	6	82	Medium	Yes	1	Low	High
19	15	80	Medium	Medium	Yes	9	91	Low	Yes	3	Low	Medium
20	12	75	Medium	High	Yes	7	58	Medium	Yes	3	Medium	Medium
21	29	78	Medium	Medium	No	5	99	High	Yes	0	High	Medium
22	19	99	Medium	High	No	6	84	Medium	Yes	1	Medium	High
23	20	74	Medium	High	No	8	89	Low	Yes	1	Medium	Medium
24	11	78	High	Medium	Yes	8	100	High	Yes	1	Low	Medium
25	17	65	Low	High	Yes	5	75	Medium	Yes	2	Low	Medium
26	21	62	High	Low	Yes	6	54	High	Yes	0	High	High

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The screenshot shows the RStudio interface with a script editor on the left and the Environment pane on the right. The script is titled 'S081\_R\_Practical6.R' and contains the following code:

```
1 # Practical 6: Merge and Append
2
3 install.packages("dplyr")
4 library(dplyr)
5
6 # Create data sets
7 data_jan <- data.frame(
8   ID = c(1, 2, 3),
9   Name = c("Alice", "Bob", "Charlie"),
10  Jan_Sales = c(100, 150, 200)
11 )
12
13 data_feb <- data.frame(
14   ID = c(1, 2, 3),
15   Name = c("Alice", "Bob", "Charlie"),
16   Feb_Sales = c(120, 160, 210)
17 )
18
19 data_new_hires <- data.frame(
20   ID = c(4, 5),
21   Name = c("David", "Eva"),
22   Jan_Sales = c(50, 60)
23 )
24
25 print("---- Data January ----")
26 print(data_jan)
27
28 print("---- Data February ----")
29 print(data_feb)
30
31 # Merge data sets (add columns)
32 merged_data <- merge(data_jan, data_feb, by = c("ID", "Name"))
33 print("---- Merged Data ----")
34 print(merged_data)
35
36 # Append data sets (add rows)
37 final_list <- bind_rows(data_jan, data_new_hires)
38 print("---- Appended Data ----")
39 print(final_list)
40
```

The Environment pane on the right shows the following data objects:

Object	Obs.	Vars.
data_feb	3	3
data_jan	3	3
data_new_hir...	2	3
final_list	5	3
merged_data	3	4

The screenshot shows the RStudio console with the following output:

```
> R 4.5.2 - /
> # Practical 6: Merge and Append

Warning message:
In file.copy(savedcopy, lib, recursive = TRUE) :
  problem copying c:\Users\itlab\AppData\Local\R\win-library\4.5\00LOCK\dplyr\libs\x64\dplyr.dll to c:\Users\itlab\AppData\Local\R\win-library\4.5\dplyr\libs\x64\dplyr.dll: permission denied

>
> install.packages("dplyr")

WARNING: Rtools is required to build R packages but is not currently installed. Please download and install the appropriate version of R tools before proceeding:

https://cran.rstudio.com/bin/windows/rtools/

Installing package into 'c:/Users/itlab/AppData/Local/R/win-library/4.5'
(as 'lib' is unspecified)
trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.5/dplyr_1.1.4.zip'
Content type 'application/zip' length 1593482 bytes (1.5 MB)
downloaded 1.5 MB

package 'dplyr' successfully unpacked and MD5 sums checked

The downloaded binary packages are in
c:\Users\itlab\AppData\Local\Temp\Rtmpujkyma\downloaded_packages
> library(dplyr)

Attaching package: 'dplyr'

The following objects are masked from 'package:stats':
  filter, lag

The following objects are masked from 'package:base':
  intersect, setdiff, setequal, union

> # Create data sets
> data_jan <- data.frame(
+   ID = c(1, 2, 3),
+   Name = c("Alice", "Bob", "Charlie"),
+   Jan_Sales = c(100, 150, 200)
+ )
```

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This screenshot shows the RStudio interface with the following code in the console:

```
> # Create data sets
> data_jan <- data.frame(
+   ID = c(1, 2, 3),
+   Name = c("Alice", "Bob", "Charlie"),
+   Jan_Sales = c(100, 150, 200)
+ )
>
> data_feb <- data.frame(
+   ID = c(1, 2, 3),
+   Name = c("Alice", "Bob", "Charlie"),
+   Feb_Sales = c(120, 160, 210)
+ )
>
> data_new_hires <- data.frame(
+   ID = c(4, 5),
+   Name = c("David", "Eva"),
+   Jan_Sales = c(50, 60)
+ )
>
> print("---- Data January ----")
[1] "---- Data January ----"
> print(data_jan)
  ID Name Jan_Sales
1  1  Alice     100
2  2   Bob     150
3  3 Charlie     200
>
> print("---- Data February ----")
[1] "---- Data February ----"
> print(data_feb)
  ID Name Feb_Sales
1  1  Alice     120
2  2   Bob     160
3  3 Charlie     210
>
> # Merge data sets (add columns)
> merged_data <- merge(data_jan, data_feb, by = c("ID", "Name"))
> print("---- Merged data ----")
[1] "---- Merged data ----"
> print(merged_data)
  ID Name Jan_Sales Feb_Sales
1  1  Alice     100       120
2  2   Bob     150       160
3  3 Charlie     200       210
>
```

The Environment pane on the right shows the following objects:

Object	Size
data_feb	3 obs. of 3 variables
data_jan	3 obs. of 3 variables
data_new_hires	2 obs. of 3 variables
final_list	5 obs. of 3 variables
merged_data	3 obs. of 4 variables

This screenshot shows the RStudio interface with the following code in the console:

```
> # Append data sets (add rows)
> final_list <- bind_rows(data_jan, data_new_hires)
> print("---- Appended data ----")
[1] "---- Appended data ----"
> print(final_list)
  ID Name Jan_Sales
1  1  Alice     100
2  2   Bob     150
3  3 Charlie     200
4  4  David      50
5  5   Eva      60
>
```

The Environment pane on the right shows the following objects:

Object	Size
data_feb	3 obs. of 3 variables
data_jan	3 obs. of 3 variables
data_new_hires	2 obs. of 3 variables
final_list	5 obs. of 3 variables
merged_data	3 obs. of 4 variables

With Dataset

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The screenshot shows the RStudio interface with a script editor containing R code for loading and inspecting two datasets. The code includes comments and function calls to read CSV files, print their structures and column names, and find common columns. The environment pane on the right shows the loaded datasets: 'app...' (2000 obs), 'dat...' (3 obs), 'dat...' (3 obs), 'dat...' (2 obs), 'dat...' (1000 obs), 'fin...' (1000 obs), 'ful...' (273106 obs), 'inn...' (273106 obs), 'lef...' (273106 obs), 'mer...' (3 obs), 'rig...' (273106 obs), 'stu...' (6607 obs), and 'stu...' (1000 obs). The console is empty.

```
41 # With uploaded Data sets-----
42
43 # PRACT-6 : MERGE + APPEND ON YOUR Data sets With Data sets
44
45 library(dplyr)
46
47 # -----
48 # 1. LOAD BOTH DATASETS
49 # -----
50
51 data1 <- read.csv("C:/Users/itlab/OneDrive/Desktop/S081_R_Studio/study_performance.csv")
52 data2 <- read.csv("C:/Users/itlab/OneDrive/Desktop/S081_R_Studio/study_performance_prediction.csv")
53
54 cat("\n===== DATASET 1 STRUCTURE =====\n")
55 str(data1)
56
57 cat("\n===== DATASET 2 STRUCTURE =====\n")
58 str(data2)
59
60 cat("\n===== DATASET 1 COLUMNS =====\n")
61 print(names(data1))
62
63 cat("\n===== DATASET 2 COLUMNS =====\n")
64 print(names(data2))
65
66 # -----
67 # 2. FIND COMMON COLUMNS
68 # -----
69
70 common_cols <- intersect(names(data1), names(data2))
71
72 cat("\n===== COMMON COLUMNS =====\n")
73 print(common_cols)
74
75 # -----
76 # 3. DIFFERENT TYPES OF MERGE
77 # -----
78
79 # 1 INNER JOIN (only matching rows)
80 inner_merge <- merge(data1, data2, by = common_cols)
81
82
```

The screenshot shows the continuation of the R script in RStudio. The code demonstrates different types of merge (LEFT, RIGHT, FULL OUTER) and an append operation. It includes print statements to preview the results of each operation. The environment pane on the right shows the same datasets as the first screenshot, plus 'appended\_data' (6607 obs) and 'full\_merge' (273106 obs). The console is empty.

```
76 # 3. DIFFERENT TYPES OF MERGE
77 # -----
78
79 # 1 INNER JOIN (only matching rows)
80 inner_merge <- merge(data1, data2, by = common_cols)
81
82 # 2 LEFT JOIN (all rows from data1)
83 left_merge <- merge(data1, data2, by = common_cols, all.x = TRUE)
84
85 # 3 RIGHT JOIN (all rows from data2)
86 right_merge <- merge(data1, data2, by = common_cols, all.y = TRUE)
87
88 # 4 FULL OUTER JOIN (all rows from both datasets)
89 full_merge <- merge(data1, data2, by = common_cols, all = TRUE)
90
91
92 # -----
93 # 4. APPEND (STACK ROWS)
94 # -----
95
96 appended_data <- bind_rows(data1, data2)
97
98 # -----
99 # 5. PRINT PREVIEWS
100 # -----
101
102 cat("\n===== INNER MERGE PREVIEW =====\n")
103 print(head(inner_merge))
104
105 cat("\n===== LEFT MERGE PREVIEW =====\n")
106 print(head(left_merge))
107
108 cat("\n===== RIGHT MERGE PREVIEW =====\n")
109 print(head(right_merge))
110
111 cat("\n===== FULL MERGE PREVIEW =====\n")
112 print(head(full_merge))
113
114 cat("\n===== APPENDED DATA PREVIEW =====\n")
115 print(head(appended_data))
116
117
```

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```
RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
Go to file/function Addins
Source
Console Background Jobs
R - R 4.5.2 - ~/
> ##### with uploaded data sets #####
>
> # PRACT-6 : MERGE + APPEND ON YOUR Data sets with Data sets
> library(dplyr)
>
> # -----
> # 1. LOAD BOTH DATASETS
> ##### DATASET 1 STRUCTURE #####
> str(data1)
'data.frame': 1000 obs. of 8 variables:
 $ gender      : chr "female" "female" "female" "male" ...
 $ race_ethnicity : chr "group B" "group C" "group B" "group A" ...
 $ parental_level_of_education : chr "bachelor's degree" "some college" "master's degree" "associate's degree" ...
 $ lunch       : chr "standard" "standard" "standard" "free/reduced" ...
 $ test_preparation_course : chr "none" "completed" "none" "none" ...
 $ math_score  : int 72 69 90 47 76 71 88 40 64 38 ...
 $ reading_score : int 72 90 95 57 78 83 95 43 64 60 ...
 $ writing_score : int 74 88 93 44 75 78 92 39 67 50 ...
>
> ##### DATASET 2 STRUCTURE #####
> str(data2)
'data.frame': 1000 obs. of 8 variables:
 $ gender      : chr "female" "male" "female" "male" ...
 $ race_ethnicity : chr "group D" "group D" "group D" "group B" ...
 $ parental_level_of_education : chr "some college" "associate's degree" "some college" "some college" ...
 $ lunch       : chr "standard" "standard" "free/reduced" "free/reduced" ...
 $ test_preparation_course : chr "completed" "none" "none" "none" ...
 $ math_score  : int 59 96 57 70 83 68 82 46 80 57 ...
 $ reading_score : int 70 93 76 70 85 57 83 61 75 69 ...
 $ writing_score : int 78 87 77 63 86 54 80 58 73 77 ...
>
> ##### DATASET 1 COLUMNS #####
> print(names(data1))
[1] "gender" "race_ethnicity" "parental_level_of_education" "lunch" "test_preparation_course"
[6] "math_score" "reading_score" "writing_score"
>
> ##### DATASET 2 COLUMNS #####
> print(names(data2))
[1] "gender" "race_ethnicity" "parental_level_of_education" "lunch" "test_preparation_course"
[6] "math_score" "reading_score" "writing_score"
>
> # -----
> # 2. FIND COMMON COLUMNS
> common_cols <- intersect(names(data1), names(data2))
>
> ##### COMMON COLUMNS #####
> print(common_cols)
[1] "gender" "lunch"
>
> # -----
> # 3. DIFFERENT TYPES OF MERGE
>
> # 1 INNER JOIN (only matching rows)
> inner_merge <- merge(data1, data2, by = common_cols)
>
> # 2 LEFT JOIN (all rows from data1)
> left_merge <- merge(data1, data2, by = common_cols, all.x = TRUE)
>
> # 3 RIGHT JOIN (all rows from data2)
> right_merge <- merge(data1, data2, by = common_cols, all.y = TRUE)
```

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Roll no. :- S081

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The screenshot shows the RStudio environment with the following components:

- Source Editor:** Contains R code for merging two datasets, binding rows, and printing previews. The code includes comments and uses functions like `full_join`, `merge`, `bind_rows`, and `cat`.
- Console:** Displays the output of the R code, showing the structure of the merged data and the results of the `print` statements. The output includes column names, data types, and the first few rows of the data.
- Environment:** Shows the current environment with variables like `app`, `dat`, `fin`, `ful`, `inn`, `lef`, `mer`, `rig`, `stu`, and `com`.
- Files:** Shows the file explorer with a list of files and folders.
- Plots:** Shows the plot pane, which is currently empty.
- Pack:** Shows the package manager, which is currently empty.

The R code in the Source Editor is as follows:

```
R - R4.2.2 - ~/...
> # 4 FULL OUTER JOIN (all rows from both datasets)
> full_merge <- merge(data1, data2, by = common_cols, all = TRUE)
>
>
> # -----
> # 4. APPEND (STACK ROWS)
> # -----
> appended_data <- bind_rows(data1, data2)
>
>
> # -----
> # 5. PRINT PREVIEWS
> # -----
> cat("\n===== INNER MERGE PREVIEW =====\n")
===== INNER MERGE PREVIEW =====
> print(head(inner_merge))
  gender      lunch race.ethnicity parental_level.of.education test_preparation.course math.score reading.score writing.score race.ethnicity
1 female free/reduced      group A          high school      completed              77              88              85      group C
2 female free/reduced      group A          high school      completed              77              88              85      group B
3 female free/reduced      group A          high school      completed              77              88              85      group C
4 female free/reduced      group A          high school      completed              77              88              85      group D
5 female free/reduced      group A          high school      completed              77              88              85      group B
6 female free/reduced      group A          high school      completed              77              88              85      group C
parental.level.of.education.test_preparation.course.math.score.reading.score.writing.score
1      bachelor's degree          none              69              78              78
2              high school      completed              52              59              58
3      some high school      completed              52              59              58
4      master's degree          none              93              98              94
5              high school          none              39              60              52
6              high school          none              76              90              84
>
> cat("\n===== LEFT MERGE PREVIEW =====\n")
===== LEFT MERGE PREVIEW =====
> print(head(left_merge))
  gender      lunch race.ethnicity parental_level.of.education test_preparation.course math.score reading.score writing.score race.ethnicity
1 female free/reduced      group A          high school      completed              77              88              85      group C
2 female free/reduced      group A          high school      completed              77              88              85      group B
3 female free/reduced      group A          high school      completed              77              88              85      group C
4 female free/reduced      group A          high school      completed              77              88              85      group D
5 female free/reduced      group A          high school      completed              77              88              85      group B
6 female free/reduced      group A          high school      completed              77              88              85      group B
```

The screenshot shows the RStudio interface with the R console output. The console displays the results of two merge operations: 'right.merge()' and 'full.merge()'. The output shows columns for gender, lunch, race, ethnicity, parental\_level\_of\_education, test\_preparation\_course, math\_score, reading\_score, writing\_score, and race. The output shows data for group A and group B, with some rows missing in the full merge.

```
R - R452 - ~/
1 female free/reduced group A high school completed 77 88 85 group C
2 female free/reduced group A high school completed 77 88 85 group B
3 female free/reduced group A high school completed 77 88 85 group C
4 female free/reduced group A high school completed 77 88 85 group D
5 female free/reduced group A high school completed 77 88 85 group B
6 female free/reduced group A high school completed 77 88 85 group C
parental_level_of_education test_preparation_course math_score reading_score writing_score
1 bachelor's degree none 69 78 78
2 high school completed 69 78 75
3 some high school completed 52 59 58
4 master's degree none 93 98 94
5 high school none 39 60 52
6 high school none 76 90 84
> cat("\n===== RIGHT MERGE PREVIEW =====\n")
===== RIGHT MERGE PREVIEW =====
> print(head(right_merge))
gender lunch race ethnicity parental_level_of_education test_preparation_course math_score reading_score writing_score race ethnicity
1 female free/reduced group A high school completed 77 88 85 group C
2 female free/reduced group A high school completed 77 88 85 group B
3 female free/reduced group A high school completed 77 88 85 group C
4 female free/reduced group A high school completed 77 88 85 group D
5 female free/reduced group A high school completed 77 88 85 group B
6 female free/reduced group A high school completed 77 88 85 group C
parental_level_of_education test_preparation_course math_score reading_score writing_score
1 bachelor's degree none 69 78 78
2 high school completed 69 78 75
3 some high school completed 52 59 58
4 master's degree none 93 98 94
5 high school none 39 60 52
6 high school none 76 90 84
> cat("\n===== FULL MERGE PREVIEW =====\n")
===== FULL MERGE PREVIEW =====
> print(head(full_merge))
gender lunch race ethnicity parental_level_of_education test_preparation_course math_score reading_score writing_score race ethnicity
1 female free/reduced group A high school completed 77 88 85 group C
2 female free/reduced group A high school completed 77 88 85 group B
3 female free/reduced group A high school completed 77 88 85 group C
4 female free/reduced group A high school completed 77 88 85 group D
5 female free/reduced group A high school completed 77 88 85 group B
6 female free/reduced group A high school completed 77 88 85 group C
```

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**Roll no. :- S081**

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```
RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
Go to file/function Addins
Source
Console Background Jobs
R • R 4.5.2 • ~/...
4 master's degree none 93 98 94
5 high school none 39 60 52
6 high school none 76 90 84
>
> cat("\n===== FULL MERGE PREVIEW =====\n")
===== FULL MERGE PREVIEW =====
> print(head(full_merge))
  gender  lunch race_ethnicity parental_level_of_education test_preparation_course math_score reading_score writing_score race_ethnicity
1 female free/reduced group A high school completed 77 88 85 group C
2 female free/reduced group A high school completed 77 88 85 group B
3 female free/reduced group A high school completed 77 88 85 group C
4 female free/reduced group A high school completed 77 88 85 group D
5 female free/reduced group A high school completed 77 88 85 group B
6 female free/reduced group A high school completed 77 88 85 group C
  parental_level_of_education test_preparation_course math_score reading_score writing_score
1 bachelor's degree none 69 78
2 high school completed 69 78
3 some high school completed 52 59
4 master's degree none 93 98
5 high school none 39 60
6 high school none 76 90
>
> cat("\n===== APPENDED DATA PREVIEW =====\n")
===== APPENDED DATA PREVIEW =====
> print(head(append_data))
  gender race_ethnicity parental_level_of_education lunch test_preparation_course math_score reading_score writing_score race_ethnicity
1 female group B bachelor's degree standard none 72 72 74 <NA>
2 female group C some college standard completed 69 90 88 <NA>
3 female group B master's degree standard none 90 95 93 <NA>
4 male group A associate's degree free/reduced none 47 57 44 <NA>
5 male group C some college standard none 76 78 75 <NA>
6 female group B associate's degree standard none 71 83 78 <NA>
  parental_level_of_education test_preparation_course math_score reading_score writing_score
1 <NA> <NA> NA NA NA
2 <NA> <NA> NA NA NA
3 <NA> <NA> NA NA NA
4 <NA> <NA> NA NA NA
5 <NA> <NA> NA NA NA
6 <NA> <NA> NA NA NA
> |
```

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Roll no. :- S081