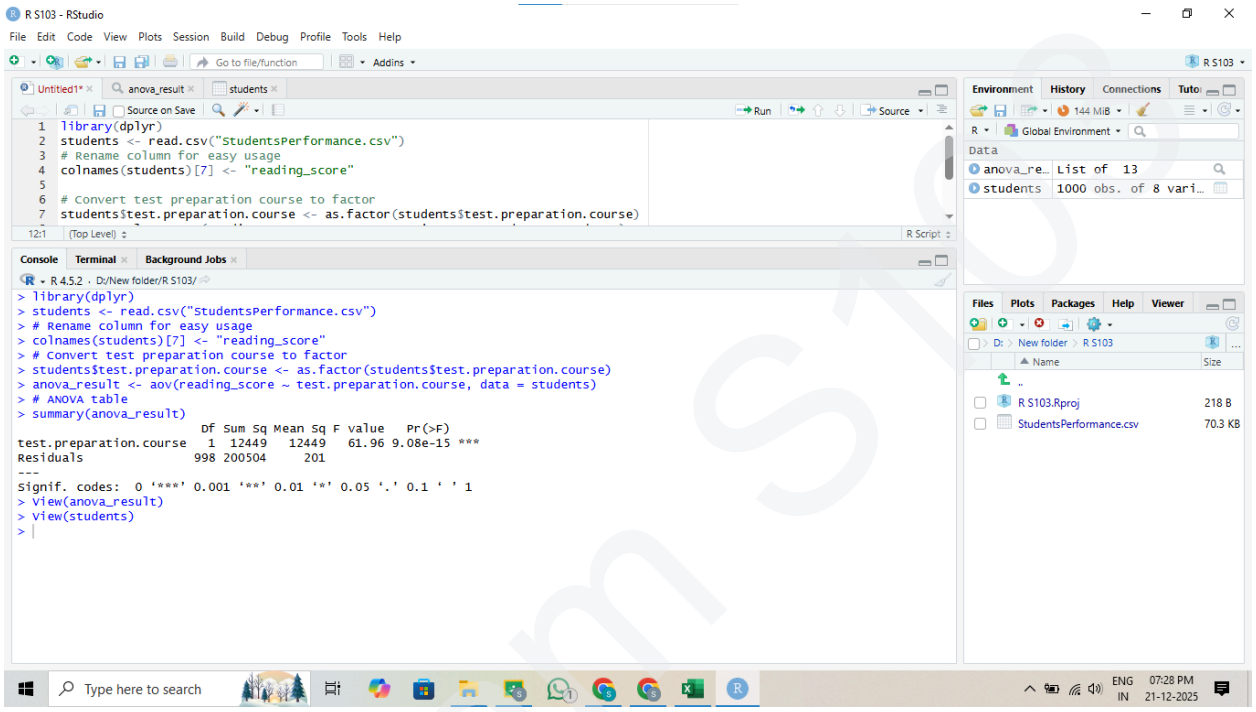
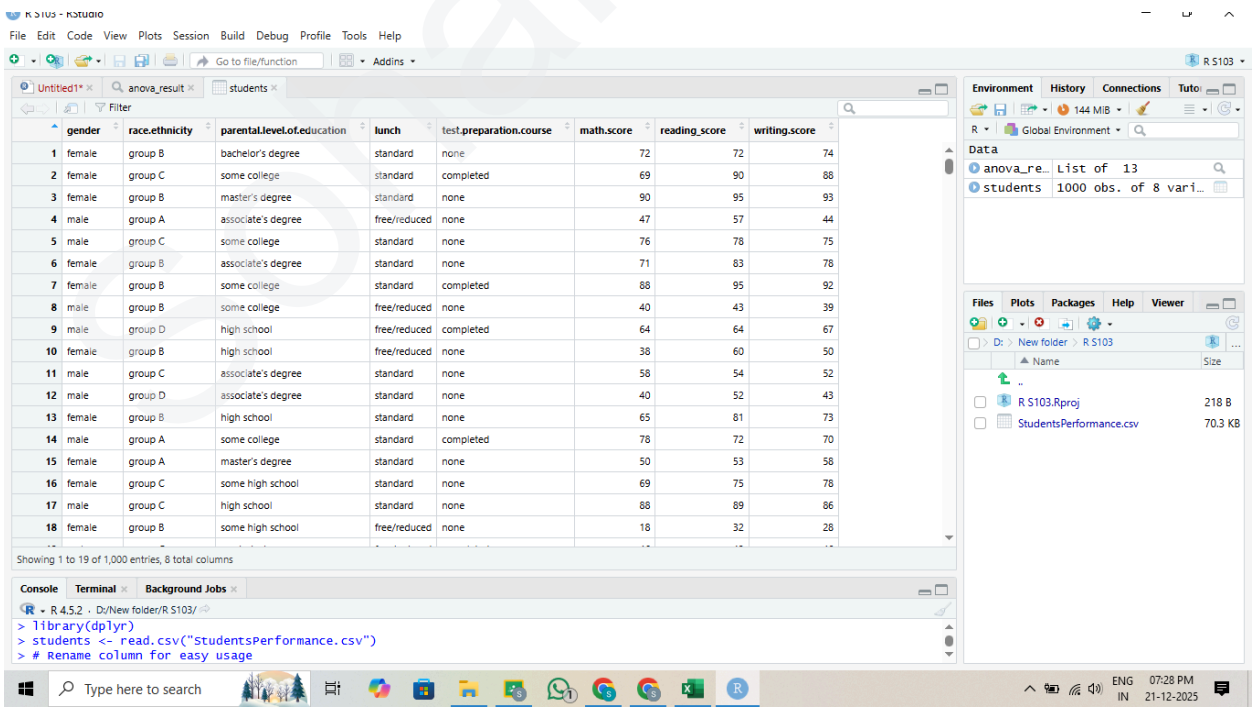
SHETH L.U.J. AND SIR M.V. COLLEGE
SUBJECT:Data Analysis with R

Aim: 7 Performing one-way ANOVA using aov() (R).
8 Performing two-way ANOVA using aov() (R).
9 Conducting Chi-square tests using chisq.test() (R)

7TH OUTPUT:





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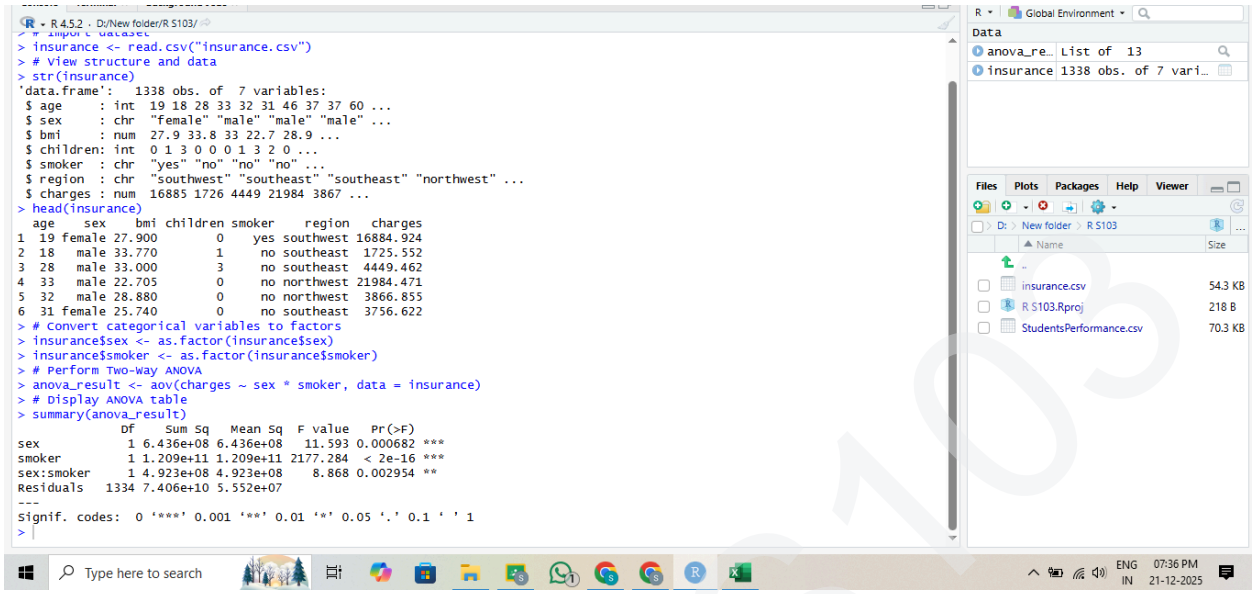
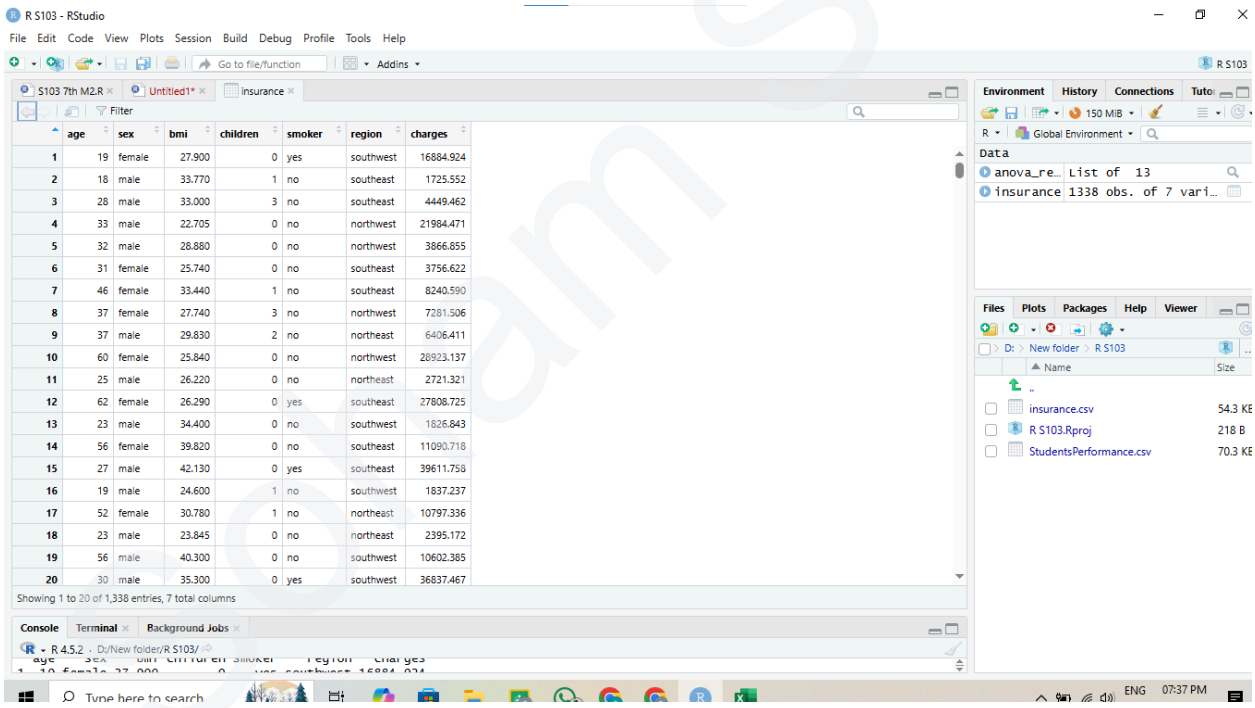
8th output:



```
> insurance <- read.csv("insurance.csv")
> # View structure and data
> str(insurance)
'data.frame':   1338 obs. of  7 variables:
 $ age     : int  19 18 28 33 32 31 46 37 37 60 ...
 $ sex     : chr  "female" "male" "male" "male" ...
 $ bmi     : num  27.9 33.8 33 22.7 28.9 ...
 $ children: int  0 1 3 0 0 1 3 2 0 ...
 $ smoker  : chr  "yes" "no" "no" "no" ...
 $ region  : chr  "southwest" "southeast" "southeast" "northwest" ...
 $ charges : num  16885 1726 4449 21984 3867 ...
> head(insurance)
  age    sex    bmi children smoker    region   charges
1  19 female 27.900        0    yes southwest 16884.924
2  18   male 33.770        1     no southeast  1725.552
3  28   male 33.000        3     no southeast  4449.462
4  33   male 22.705        0     no northwest 21984.471
5  32   male 28.880        0     no northwest  3866.855
6  31 female 25.740        0     no southeast  3756.622
> # Convert categorical variables to factors
> insurance$sex <- as.factor(insurance$sex)
> insurance$smoker <- as.factor(insurance$smoker)
> # Perform Two-Way ANOVA
> anova_result <- aov(charges ~ sex * smoker, data = insurance)
> # Display ANOVA table
> summary(anova_result)
             Df    Sum Sq   Mean Sq  F value   Pr(>F)
sex           1 6.436e+08 6.436e+08   11.593 0.000682 ***
smoker        1 1.209e+11 1.209e+11 2177.284  < 2e-16 ***
sex:smoker    1 4.923e+08 4.923e+08    8.868 0.002954 **
Residuals  1334 7.406e+10 5.552e+07
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
>
```



	age	sex	bmi	children	smoker	region	charges
1	19	female	27.900	0	yes	southwest	16884.924
2	18	male	33.770	1	no	southeast	1725.552
3	28	male	33.000	3	no	southeast	4449.462
4	33	male	22.705	0	no	northwest	21984.471
5	32	male	28.880	0	no	northwest	3866.855
6	31	female	25.740	0	no	southeast	3756.622
7	46	female	33.440	1	no	southeast	8240.590
8	37	female	27.740	3	no	northwest	7281.506
9	37	male	29.830	2	no	northeast	6406.411
10	60	female	25.840	0	no	northwest	28923.137
11	25	male	26.220	0	no	northeast	2721.321
12	62	female	26.290	0	yes	southeast	27808.725
13	23	male	34.400	0	no	southwest	1826.843
14	56	female	39.820	0	no	southeast	11090.718
15	27	male	42.130	0	yes	southeast	39611.758
16	19	male	24.600	1	no	southwest	1837.237
17	52	female	30.780	1	no	northeast	10797.336
18	23	male	23.845	0	no	northeast	2395.172
19	56	male	40.300	0	no	southwest	10602.385
20	30	male	35.300	0	yes	southwest	36837.467

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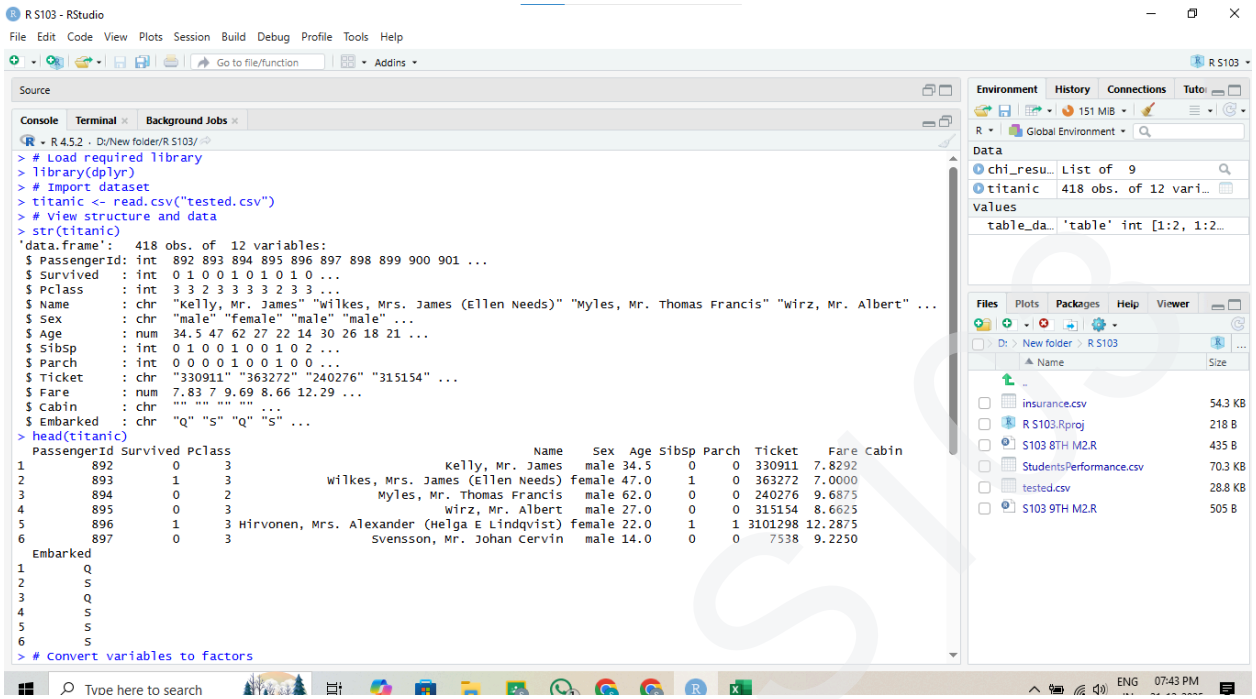
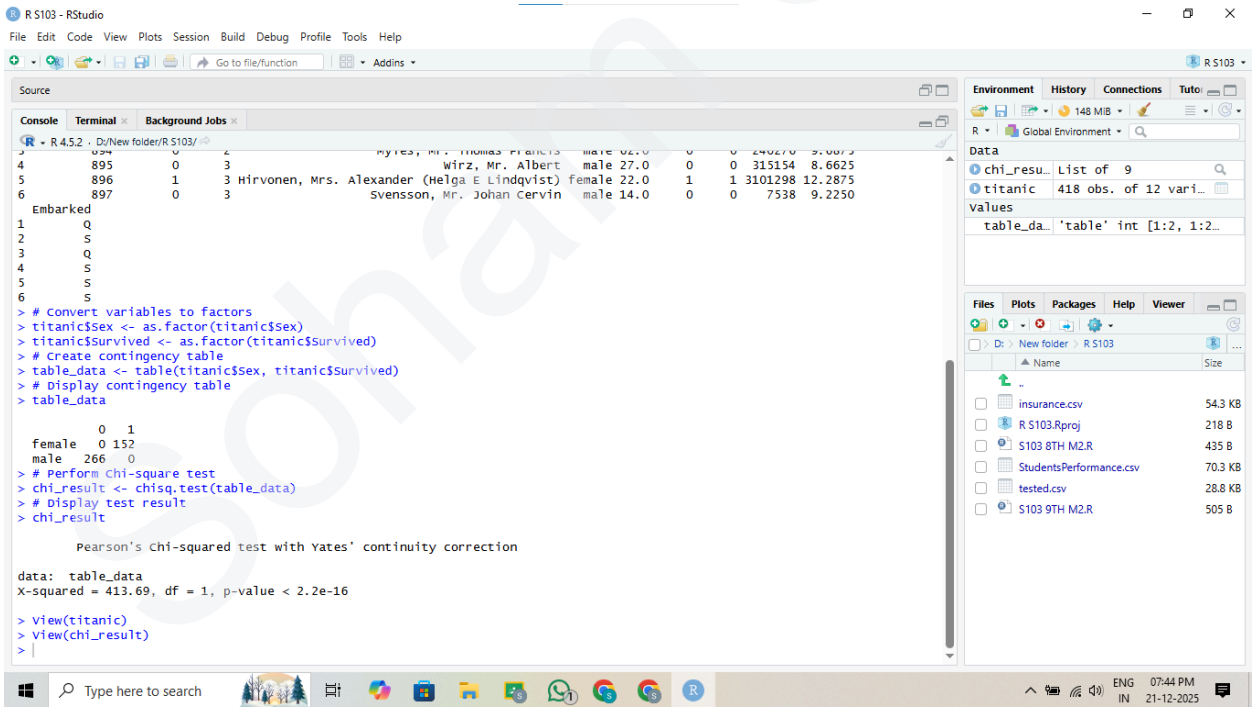
9th output:





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