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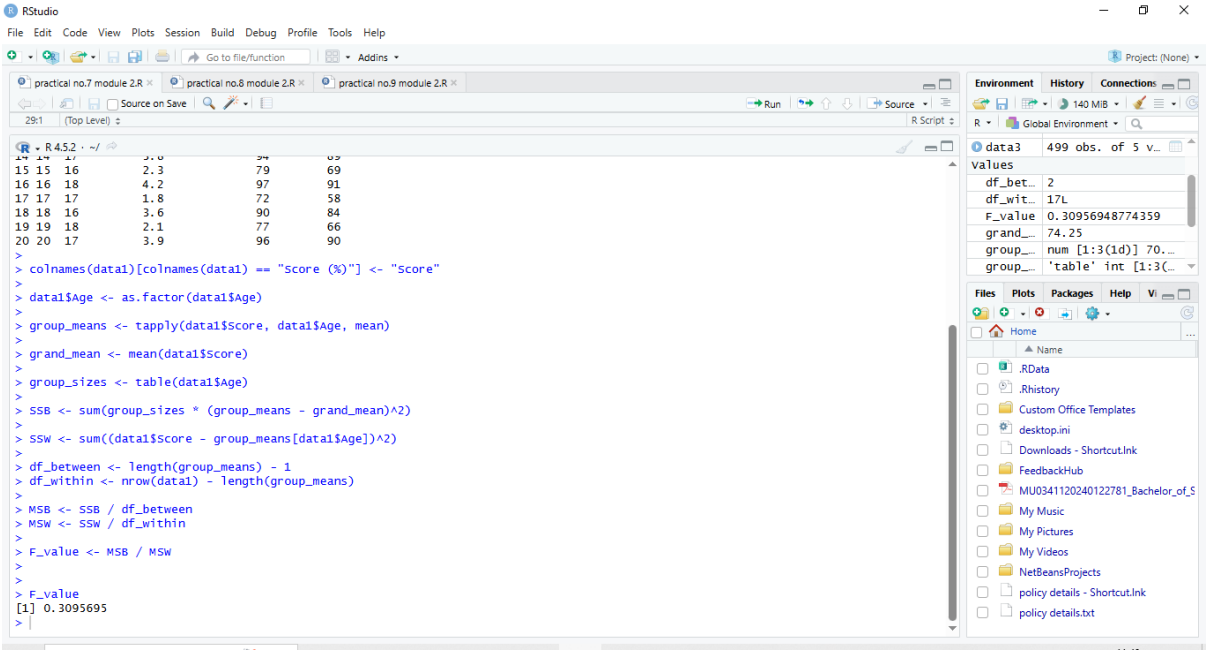
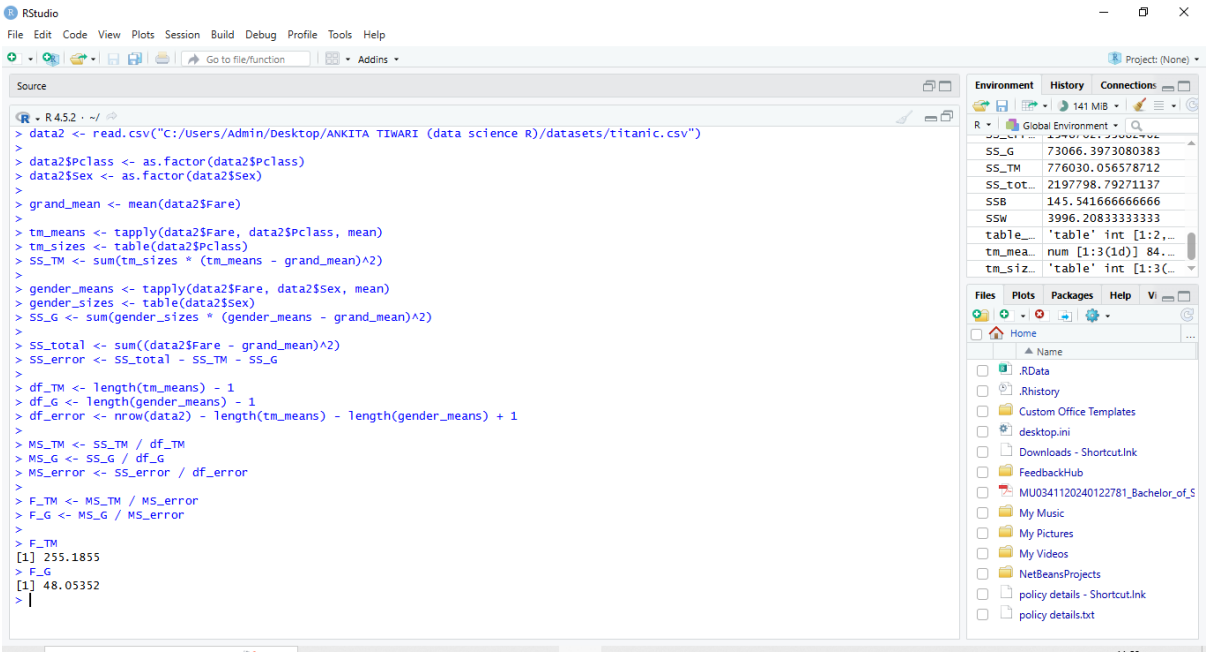
7 Performing one-way ANOVA using aov() (R).



```
15 15  16         2.3             79        69
16 16  18         4.2             97        91
17 17  17         1.8             72        58
18 18  16         3.6             90        84
19 19  18         2.1             77        66
20 20  17         3.9             96        90
>
> colnames(data1)[colnames(data1) == "Score (%)"] <- "Score"
>
> data1$Age <- as.factor(data1$Age)
>
> group_means <- tapply(data1$Score, data1$Age, mean)
>
> grand_mean <- mean(data1$Score)
>
> group_sizes <- table(data1$Age)
>
> SSB <- sum(group_sizes * (group_means - grand_mean)^2)
>
> SSW <- sum((data1$Score - group_means[data1$Age])^2)
>
> df_between <- length(group_means) - 1
> df_within <- nrow(data1) - length(group_means)
>
> MSB <- SSB / df_between
> MSW <- SSW / df_within
>
> F_value <- MSB / MSW
>
>
> F_value
[1] 0.3095695
>
```

8 Performing two-way ANOVA using aov() (R).



```
> data2 <- read.csv("C:/Users/Admin/Desktop/ANKITA TIWARI (data science R)/datasets/titanic.csv")
>
> data2$Pclass <- as.factor(data2$Pclass)
> data2$Sex <- as.factor(data2$Sex)
>
> grand_mean <- mean(data2$Fare)
>
> tm_means <- tapply(data2$Fare, data2$Pclass, mean)
> tm_sizes <- table(data2$Pclass)
> SS_TM <- sum(tm_sizes * (tm_means - grand_mean)^2)
>
> gender_means <- tapply(data2$Fare, data2$Sex, mean)
> gender_sizes <- table(data2$Sex)
> SS_G <- sum(gender_sizes * (gender_means - grand_mean)^2)
>
> SS_total <- sum((data2$Fare - grand_mean)^2)
> SS_error <- SS_total - SS_TM - SS_G
>
> df_TM <- length(tm_means) - 1
> df_G <- length(gender_means) - 1
> df_error <- nrow(data2) - length(tm_means) - length(gender_means) + 1
>
> MS_TM <- SS_TM / df_TM
> MS_G <- SS_G / df_G
> MS_error <- SS_error / df_error
>
> F_TM <- MS_TM / MS_error
> F_G <- MS_G / MS_error
>
> F_TM
[1] 255.1855
> F_G
[1] 48.05352
>
```

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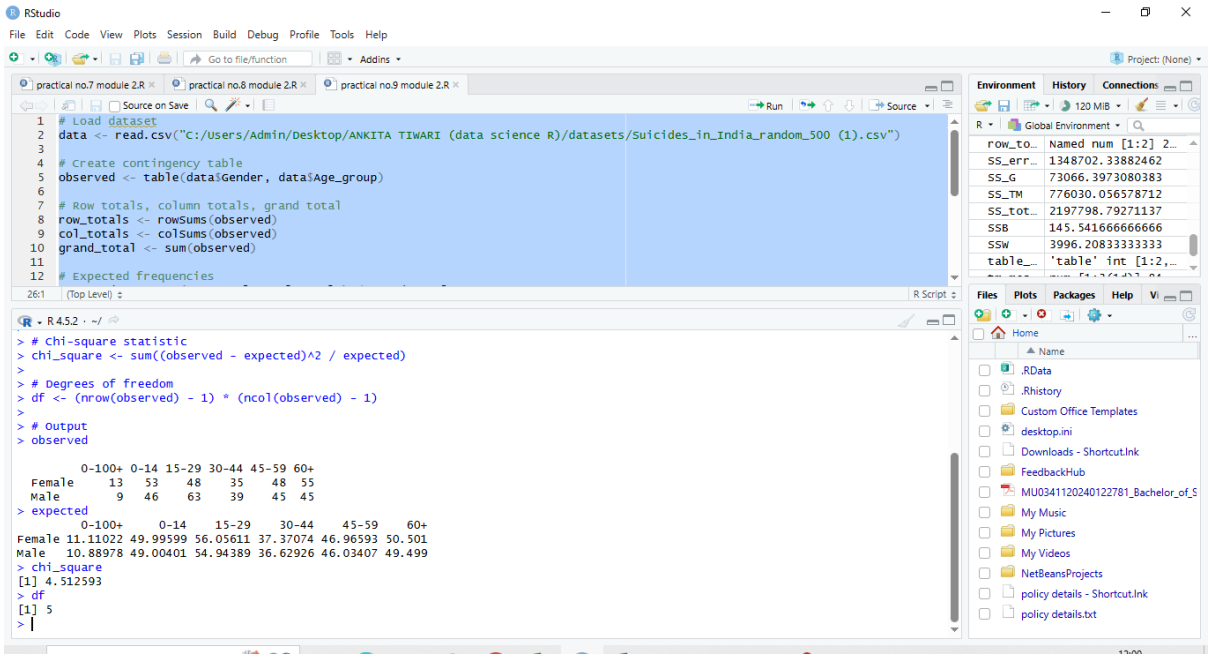
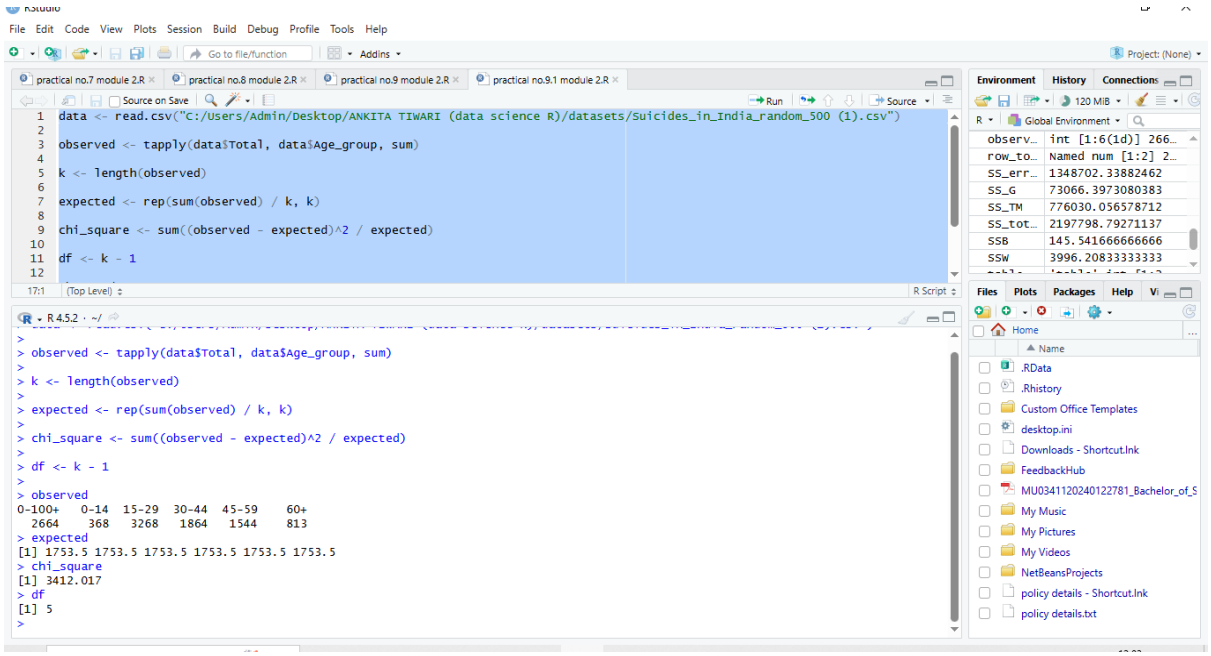
9 Conducting Chi-square tests using chisq.test() (R)

Chi-Square Test of Independence



Chi-Square Test of Goodness of Fit



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