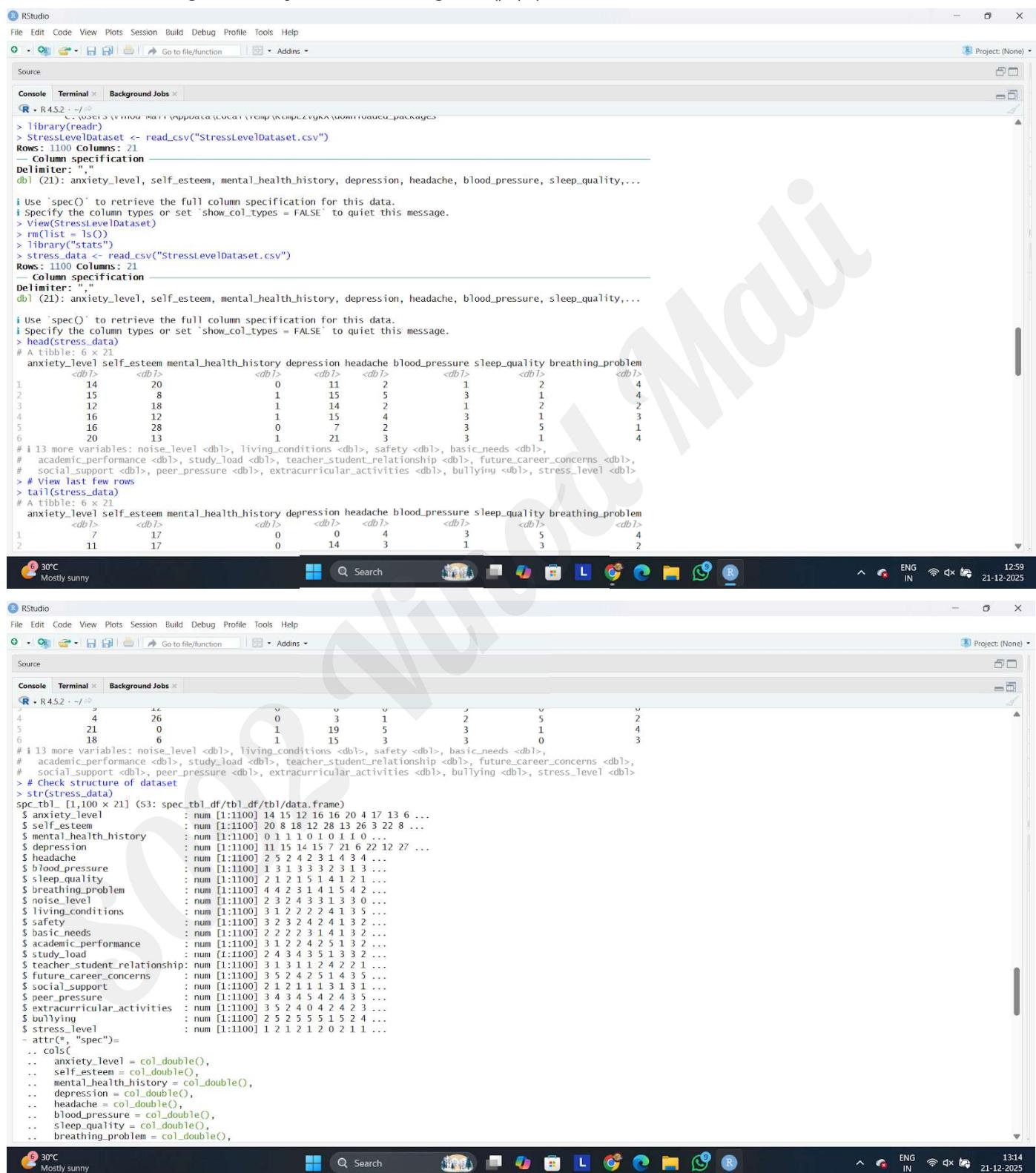


Sheth L.U.J & Sir M.V College of Science
Subject :- Data Analysis With SAS/SPSS/R
Module 2 Practical no 7

Aim :- Performing one-way ANOVA using aov() (R).



RStudio

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Project: (None)

Source

```
> library(readr)
> StressLevelDataset <- read_csv("StressLevelDataset.csv")
Rows: 1100 Columns: 21
--- Column specification ---
Delimiter: ","
dbl (21): anxiety_level, selfEsteem, mentalHealthHistory, depression, headache, bloodPressure, sleepQuality, breathingProblem, noiseLevel, livingConditions, safety, basicNeeds, academicPerformance, studyLoad, teacherStudentRelationship, futureCareerConcerns, socialSupport, peerPressure, extracurricularActivities, bullying, stressLevel

# A tibble: 6 x 21
#>   anxiety_level selfEsteem mentalHealthHistory depression headache bloodPressure sleepQuality breathingProblem
#>   <dbl>        <dbl>          <dbl>       <dbl>      <dbl>       <dbl>       <dbl>           <dbl>
#> 1        14        20            0          11        2         1         2          4
#> 2        15         8            1          15        5         3         1          4
#> 3        12        18            1          14        2         1         2          2
#> 4        16        12            1          15        4         3         1          3
#> 5        16        28            0          7         2         3         5          1
#> 6        20        13            1          21        3         3         1          4
#> # i 13 more variables: noise_level <dbl>, living_conditions <dbl>, safety <dbl>, basic_needs <dbl>,
#> # academic_performance <dbl>, study_load <dbl>, teacher_student_relationship <dbl>, future_career_concerns <dbl>,
#> # social_support <dbl>, peer_pressure <dbl>, extracurricular_activities <dbl>, bullying <dbl>, stress_level <dbl>
#> # View last few rows
#> tail(stress_data)
#> # A tibble: 6 x 21
#>   anxiety_level selfEsteem mentalHealthHistory depression headache bloodPressure sleepQuality breathingProblem
#>   <dbl>        <dbl>          <dbl>       <dbl>      <dbl>       <dbl>       <dbl>           <dbl>
#> 1        7         17            0          0         4         3         5          4
#> 2       11        17            0          14        3         1         3          2
```

6 30°C Mostly sunny

Search

12:59 21-12-2025

RStudio

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Project: (None)

Source

```
> R 4.5.2 - /-
#> 
#>   4      26      0      0      3      1      2      5      2
#>   5      21      0      1      19      5      3      1      4
#>   6      18      6      1      15      3      3      0      3
#> # i 13 more variables: noise_level <dbl>, living_conditions <dbl>, safety <dbl>, basic_needs <dbl>,
#> # academic_performance <dbl>, study_load <dbl>, teacher_student_relationship <dbl>, future_career_concerns <dbl>,
#> # social_support <dbl>, peer_pressure <dbl>, extracurricular_activities <dbl>, bullying <dbl>, stress_level <dbl>
#> # Check structure of dataset
#> str(stress_data)
spc_tb1_<-tibble::tbl_df/tbl_df/tbl/data.frame)
#> # anxiety_level : num [1:1100] 14 15 12 16 20 4 17 13 6 ...
#> # selfEsteem : num [1:1100] 20 8 18 12 28 13 26 3 22 8 ...
#> # mentalHealthHistory : num [1:1100] 0 1 1 1 0 1 0 1 1 0 ...
#> # depression : num [1:1100] 11 15 14 15 7 21 6 22 12 27 ...
#> # headache : num [1:1100] 2 5 2 4 2 3 1 4 3 4 ...
#> # bloodPressure : num [1:1100] 1 3 1 3 3 3 2 3 1 3 ...
#> # sleepQuality : num [1:1100] 2 1 2 1 5 1 4 1 2 1 ...
#> # breathingProblem : num [1:1100] 4 4 2 3 1 4 1 5 4 2 ...
#> # noiseLevel : num [1:1100] 2 3 2 4 3 3 1 3 3 0 ...
#> # livingConditions : num [1:1100] 3 1 2 2 2 2 4 1 3 5 ...
#> # safety : num [1:1100] 3 2 3 2 4 2 4 1 3 2 ...
#> # basicNeeds : num [1:1100] 2 2 2 2 3 1 4 1 3 2 ...
#> # academicPerformance : num [1:1100] 3 1 2 2 4 2 5 1 3 2 ...
#> # studyLoad : num [1:1100] 2 4 3 4 3 5 1 3 2 ...
#> # teacherStudentRelationship : num [1:1100] 3 1 3 1 1 2 4 2 2 1 ...
#> # futureCareerConcerns : num [1:1100] 3 5 2 4 2 5 1 4 3 5 ...
#> # socialSupport : num [1:1100] 2 1 2 1 1 1 3 1 3 1 ...
#> # peerPressure : num [1:1100] 3 4 3 4 5 4 2 4 3 5 ...
#> # extracurricularActivities : num [1:1100] 3 5 2 4 0 4 2 4 2 3 ...
#> # bullying : num [1:1100] 2 5 2 5 5 5 1 5 2 4 ...
#> # stressLevel : num [1:1100] 1 2 1 2 1 2 0 2 1 1 ...
#> # attr(*, "spec")=
#> #   cols(
#> #     anxiety_level = col_double(),
#> #     selfEsteem = col_double(),
#> #     mentalHealthHistory = col_double(),
#> #     depression = col_double(),
#> #     headache = col_double(),
#> #     bloodPressure = col_double(),
#> #     sleepQuality = col_double(),
#> #     breathingProblem = col_double(),
```

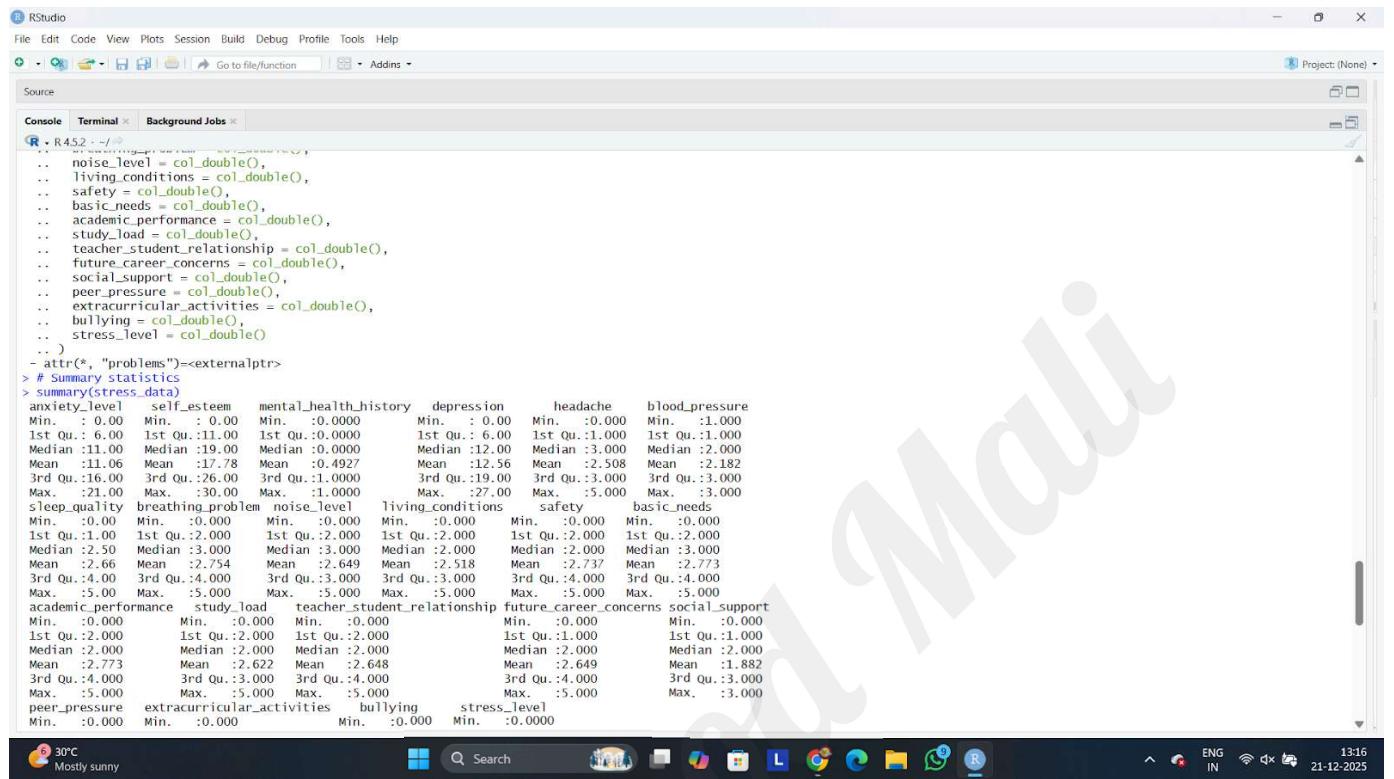
6 30°C Mostly sunny

Search

13:14 21-12-2025

Name :- Vinod Mali
Roll No :- S092

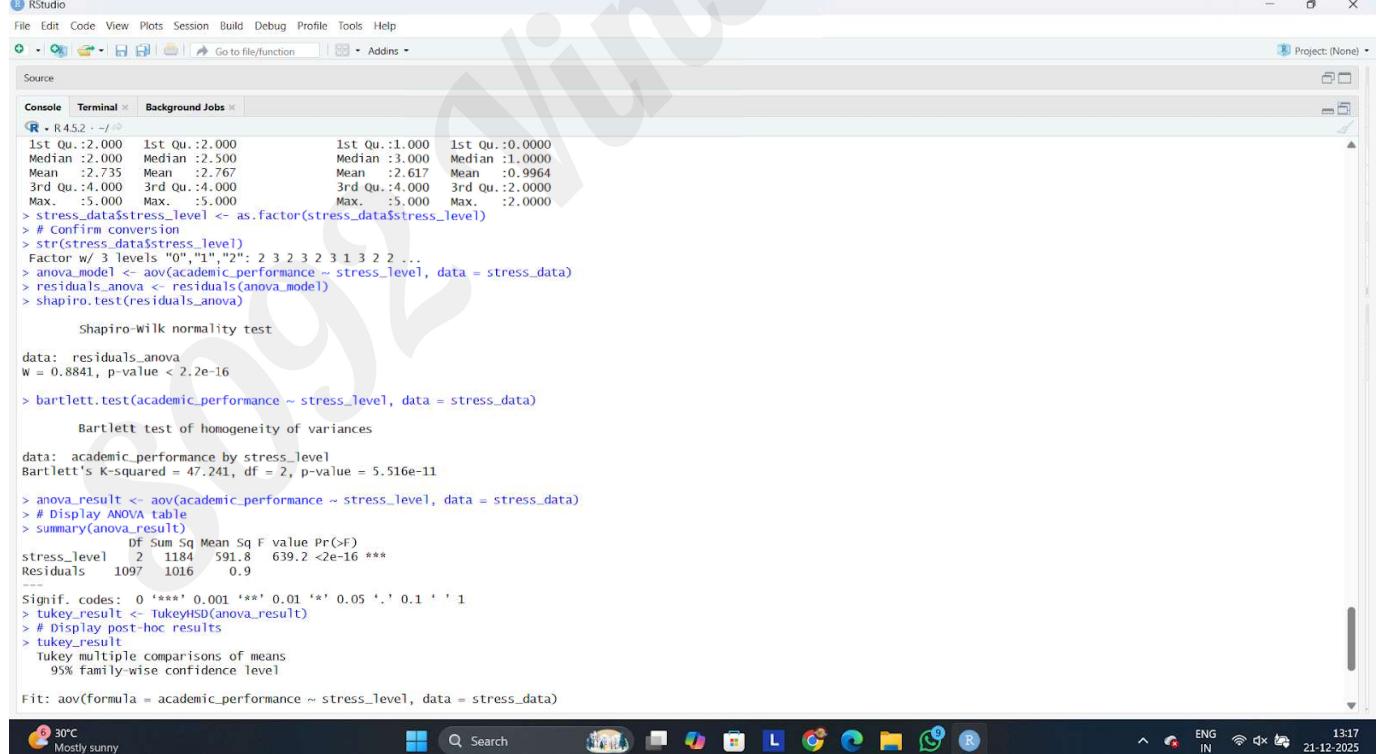
Sheth L.U.J & Sir M.V College of Science
Subject :- Data Analysis With SAS/SPSS/R
Module 2 Practical no 7



```

R - R 4.5.2 - ~
...
noise_level = col_double(),
living_conditions = col_double(),
safety = col_double(),
basic_needs = col_double(),
academic_performance = col_double(),
study_load = col_double(),
teacher_student_relationship = col_double(),
future_career_concerns = col_double(),
social_support = col_double(),
peer_pressure = col_double(),
extracurricular_activities = col_double(),
bullying = col_double(),
stress_level = col_double()
...
)
- attr(*, "problems")=<externalptr>
> # Summary statistics
> summary(stress_data)
anxiety_level self_esteem mental_health_history depression headache blood_pressure
Min. : 0.00 Min. : 0.00 Min. : 0.0000 Min. : 0.00 Min. : 0.0000 Min. : 1.000
1st Qu.: 6.00 1st Qu.:11.00 1st Qu.:0.0000 1st Qu.: 6.00 1st Qu.:1.000 1st Qu.:1.000
Median :11.00 Median :19.00 Median :0.0000 Median :12.00 Median :3.000 Median :2.000
Mean :11.06 Mean :17.78 Mean : 0.4927 Mean :12.56 Mean :2.508 Mean :2.182
3rd Qu.:16.00 3rd Qu.:26.00 3rd Qu.:1.0000 3rd Qu.:19.00 3rd Qu.:3.000 3rd Qu.:3.000
Max. :21.00 Max. :30.00 Max. :1.0000 Max. :27.00 Max. :5.000 Max. :3.000
sleep_quality breathing_problem noise_level living_conditions safety basic_needs
Min. : 0.00 Min. : 0.0000 Min. : 0.0000 Min. : 0.0000 Min. : 0.0000 Min. : 0.000
1st Qu.: 1.00 1st Qu.:2.000 1st Qu.:2.000 1st Qu.:2.000 1st Qu.:2.000 1st Qu.:2.000
Median :2.50 Median :3.000 Median :3.000 Median :2.000 Median :2.000 Median :3.000
Mean : 2.66 Mean :2.754 Mean :2.649 Mean :2.518 Mean :2.737 Mean :2.773
3rd Qu.: 4.00 3rd Qu.:4.000 3rd Qu.:3.000 3rd Qu.:4.000 3rd Qu.:4.000 3rd Qu.:4.000
Max. : 5.00 Max. :5.000 Max. :5.000 Max. :5.000 Max. :5.000 Max. :5.000
academic_performance study_load teacher_student_relationship future_career_concerns social_support
Min. : 0.000 Min. : 0.000 Min. : 0.000 Min. : 0.000 Min. : 0.000
1st Qu.: 2.000 1st Qu.:2.000 1st Qu.:2.000 1st Qu.:1.000 1st Qu.:1.000
Median :2.000 Median :2.000 Median :2.000 Median :2.000 Median :2.000
Mean : 2.773 Mean :2.622 Mean :2.648 Mean :2.649 Mean :1.882
3rd Qu.: 4.000 3rd Qu.:3.000 3rd Qu.:4.000 3rd Qu.:4.000 3rd Qu.:3.000
Max. : 5.000 Max. :5.000 Max. :5.000 Max. :5.000 Max. :3.000
peer_pressure extracurricular_activities bullying stress_level
Min. : 0.000 Min. : 0.000 Min. : 0.000 Min. : 0.0000

```



```

R - R 4.5.2 - ~
1st Qu.:2.000 1st Qu.:2.000 1st Qu.:1.000 1st Qu.:0.0000
Median :2.000 Median :2.500 Median :3.000 Median :1.0000
Mean :2.735 Mean :2.767 Mean :2.617 Mean :0.9964
3rd Qu.:4.000 3rd Qu.:4.000 3rd Qu.:4.000 3rd Qu.:2.0000
Max. :5.000 Max. :5.000 Max. :5.000 Max. :2.0000
> stress_data$stress_level <- as.factor(stress_data$stress_level)
> # Confirm conversion
> str(stress_data$stress_level)
Factor w/ 3 levels "0","1","2": 2 3 2 3 2 3 1 3 2 2 ...
> anova_model <- aov(academic_performance ~ stress_level, data = stress_data)
> residuals_anova <- residuals(anova_model)
> shapiro.test(residuals_anova)

Shapiro-Wilk normality test

data: residuals_anova
W = 0.8841, p-value < 2.2e-16

> bartlett.test(academic_performance ~ stress_level, data = stress_data)

Bartlett test of homogeneity of variances

data: academic_performance by stress_level
Bartlett's K-squared = 47.241, df = 2, p-value = 5.516e-11

> anova_result <- aov(academic_performance ~ stress_level, data = stress_data)
> # Display ANOVA table
> summary(anova_result)
   Df Sum Sq Mean Sq F value Pr(>F)
stress_level    2   1184   591.8   639.2 <2e-16 ***
Residuals     1097   1016     0.9
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
> tukey_result <- TukeyHSD(anova_result)
> # Display post-hoc results
> tukey_result
Tukey multiple comparisons of means
 95% family-wise confidence level

Fit: aov(formula = academic_performance ~ stress_level, data = stress_data)

```

Name :- Vinod Mali
Roll No :- S092

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```
$stress_level
    diff      lwr      upr p adj
1=0 -1.6504710 -1.8175470 -1.4833951 0
2=0 -2.4808445 -2.6466449 -2.3150442 0
2=1 -0.8303735 -0.9978923 -0.6628547 0
>
>
```

