EXPERIMENT -14

Hypothetical using ANOVA Test

Aim:

To compare the growth rates of plants under three different fertilizer treatments(Treatment A,B,C) to determine if there is a significant difference in their mean growth.

Procedure:

- Null hypothesis
- Alternative hypothesis
- Sample
- ANOVA
- Decision Rule

Program:

```
import numpy as np
import scipy.stats as stats
np.random.seed(42)
n_plants=25
a=np.random.normal(loc=10,scale=2,size=n_plants)
b=np.random.normal(loc=12,scale=3,size=n_plants)
c=np.random.normal(loc=15,scale=2.5,size=n_plants)
d=np.concatenate([a,b,c])
tl=['A']*n_plants+['B']*n_plants+['C']*n_plants
fs,pv=stats.f_oneway(a,b,c)
print("Treatment A Mean Growth: ",np.mean(a))
print("Treatment B Mean Growth: ",np.mean(b))
print("Treatment C Mean Growth: ",np.mean(c))
print()
print(f"F-statistic : {fs:.4f}")
print(f"P-value : {pv:.4f}")
alpha=0.05
if pv<alpha:
  print("Reject the null hypothesis:There is a significant differnece in mean growth ratesamong three treatments")
else:
  print("Fail to reject the null hypothesis: There is no significant difference in mean growth among three treatme

if pv<alpha:
  from statsmodels.stats.multicomp import pairwise_tukeyhsd
  tuckey_results=pairwise_tukeyhsd(d,tl,alpha=0.05)
  print("\nTukey'sHSD Post-hoc test:",tuckey_results)
```

```
Treatment A Mean Growth:  9.672983882683818
Treatment B Mean Growth:  11.137680744437432
Treatment C Mean Growth:  15.265234904828972

F-statistic : 36.1214
P-value : 0.0000
Reject the null hypothesis:There is a significant differnece in mean growth ratesamong three treatments

Tukey'sHSD Post-hoc test: Multiple Comparison of Means - Tukey HSD, FWER=0.05
==================================================
group1 group2 meandiff p-adj   lower  upper  reject
--------------------------------------------------
     A      B   1.4647 0.0877 -0.1683 3.0977  False
     A      C   5.5923    0.0  3.9593 7.2252   True
     B      C   4.1276    0.0  2.4946 5.7605   True
--------------------------------------------------
```

Result:

Thus the python program for hypothetical using ANOVA test is executed and output verified successfully