COMPLETELY RANDOMIZED DESIGN

MODEL FOR ONE WAY ANOVA

AIM:

To find the ANOVA using CRD to test the null hypothesis (H_0) against alternative hypothesis(H_1)

with level of significance , alpha=0.05.

MODEL:

$Y_{ij} = \mu + \alpha_i + \epsilon_{ij}$ where ϵ_{ij} is the deviation of the jth observation of the ith sample from the corresponding treatment mean (ie) random error, Y_{ij} jth observation from the ith treatment, μ is the grand mean and α_i is the effect of ith treatment.

PROCEDURE:

The null hypothesis that the k population means are equal against the alternative that at least two of the means are unequal.

The null hypothesis is rejected if $P = P\{F[k-1, k(n-1)] > F\}$ *or* $\Pr(>F)$ is less than alpha value or else null hypothesis is accepted.

SYNTAX USED

Syntax	Description
read.table(file,header=TRUE)	The name of the *file* which the data are to be read form. *header* a logical value indicating whether the file contains the names of the variables as its first line.
file.choose()	Choose a file interactively from the directory.
as.matrix()	Converts its first argument into a matrix, the dimensions of which will be inferred from the input.
gl(n,k,n*k,labels=seq_len(n))	Generate factors by specifying the pattern of their levels.
aov(arg1~arg2)	Anova command. The first argument is always the dependent variable and the second is independent variable.
summary( )	It is a generic function to produce result summaries of the results of anova
Boxplot( )	Produce box and whisker plots of the given values.

The NIST data set contains the absorption of moisture by concrete depending on the weight percentage of an unknown ingredient.

```
group1<-c(551,457,450,731,499,632)
group2<-c(595,580,508,583,633,517)
group3<-c(639,615,511,573,648,677)
group4<-c(417,449,517,438,415,555)
group5<-c(563,631,522,613,656,679)
```

construct a one way anova and test whether each weight percentage has its own mean.

RANDOMIZED BLOCK DESIGN

AIM:

To find the ANOVA using RBD to test the null hypotheses against alternative hypotheses with level of significance , alpha=0.05.

MODEL:

$Y_{ij} = \mu + \alpha_i + \beta_j + \epsilon_{ij}$ where ϵ_{ij} is the deviation of the jth observation of the ith sample from the corresponding treatment mean (ie) random error, Y_{ij} jth observation from the ith treatment, μ is the grand mean , α_i is the effect of ith treatment and β_j is the effect of the jth block .

SYNTAX USED

Syntax	Description
read.table(file,header=TRUE)	The name of the *file* which the data are to be read form. *header* a logical value indicating whether the file contains the names of the variables as its first line.
file.choose()	Choose a file interactively from the directory.
as.matrix()	Converts its first argument into a matrix, the dimensions of which will be inferred from the input.
gl(n,k,n*k,labels=seq_len(n))	Generate factors by specifying the pattern of their levels.

aov(arg1~arg2)	Anova command. The first argument is always the dependent variable and the second is independent variable.
summary( )	It is a generic function to produce result summaries of the results of anova
par(mfrow=c(n,k))	To create a matrix of n rows and k columns plots
interaction.plot()	Plots the mean of the response for two way combinations of factors.
plot( )	Generic function for plotting objects.

Four different machines M1, M2, M3 and M4 are being considered for the assembling of a particular product. It was decided that six different operators would be used in a randomized block experiment to compare the machines. The machines were assigned in a random order to each operator. The operation of the machines requires physical dexterity , and it was

anticipated that there would be a difference among the operators in the speed with which they operated the machines. The amounts of time (in seconds) required to assemble the product are shown in the table below. Test the hypothesis H0 at the 0.05 level of significance, that the machines perform at the same mean rate of speed and there is no significance difference between the performances of the operators.

	Operator					
Machine	1	2	3	4	5	6
1	42.5	39.3	39.6	39.9	42.9	43.6
2	39.8	40.1	40.5	42.3	42.5	43.1
3	40.2	40.5	41.3	43.4	44.9	45.1
4	41.3	42.2	43.5	44.2	45.9	42.3