

Example: For Example 3.1.1 on page 81, we can apply the permutation F -test. The data is as follows:

Samples from normal populations with $\mu_1 = 15$, $\mu_2 = 25$, $\mu_3 = 30$, $\sigma = 9$.

Treatment 1	6.08	22.29	7.51	34.36	23.68
Treatment 2	30.45	22.71	44.52	31.47	36.81
Treatment 3	32.04	28.03	32.74	23.84	29.64

Since there are 756,756 possible permutations, the exact F -test will take a significant amount of time to run. Instead, we use the MC option which randomly samples 10,000 permutations.

```
data ta3_1_2;
input treat resp @@;
cards;
1 6.08 1 22.29 1 7.51 1 34.36 1 23.68
2 30.45 2 22.71 2 44.52 2 31.47 2 36.81
3 32.04 3 28.03 3 32.74 3 23.84 3 29.64
;
proc npar1way data=ta3_1_2 anova scores=data;
class treat;
exact scores=data /MC; /* The MC option randomly samples the permutations */
var resp;
run;
```

The NPAR1WAY Procedure

Analysis of Variance for Variable resp
Classified by Variable treat

treat	N	Mean
1	5	18.7840
2	5	33.1920
3	5	29.2580

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	2	554.619160	277.309580	3.7814	0.0533
Within	12	880.011480	73.334290		

The NPAR1WAY Procedure

Data Scores for Variable resp
Classified by Variable treat

treat	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
1	5	93.920	135.390	18.481848	18.7840
2	5	165.960	135.390	18.481848	33.1920
3	5	146.290	135.390	18.481848	29.2580

Data Scores One-Way Analysis

Chi-Square 5.4123
DF 2
Pr > Chi-Square 0.0668

The NPAR1WAY Procedure

Monte Carlo Estimate for the Exact Test

Pr >= Chi-Square
Estimate 0.0472
99% Lower Conf Limit 0.0417
99% Upper Conf Limit 0.0527

Number of Samples 10000
Initial Seed 648474678

Note that the approximate p -value is 0.0527. Running the program again gives an approximate p -value of 0.0577.

The NPAR1WAY Procedure

Monte Carlo Estimate for the Exact Test

Pr >= Chi-Square
Estimate 0.0520
99% Lower Conf Limit 0.0463
99% Upper Conf Limit 0.0577

Number of Samples 10000
Initial Seed 796513454

If we do not specify the MC option and let the program compute all 756,756 permutations, then the exact permutation F -test p -value is 0.0513.