

Appendix:

Power Analysis:

Performing the theoretical power analysis assuming the following: $\Delta = 180 \text{ seconds (3 minutes)}$, $\alpha = 0.05$, $\sigma^2 = 352.19$, and $n_i = 2$, $i = 1, 2$. (Δ is selected from the experimenter interest and σ^2 is the MSE of the full model which the experimenter fit in the exploratory part of the experiment).

Here,

$$F_{0.05,3,4} = 6.59$$
$$\delta^2 = \frac{n \times \Delta^2}{2 \times \sigma^2} = \frac{2 \times 180^2}{2 \times 352.19} = 91.995$$

So, the power is $P(F_{0.05,3,4,91.995} > 6.59) \cong 1$.

R code:

```
qf(0.05,3,4,lower.tail = FALSE)
```

```
1-pf(6.59,3,4,91.995)
```

Table 1: Treatments.

Class Level Information				
Class	Levels	Values		
trt	4	trt1	trt2	trt3 trt4

Table 2: Analysis of Variance Table.

Type 3 Analysis of Variance								
Source	DF	Sum of Squares	Mean Square	Expected Mean Square	Error Term	Error DF	F Value	Pr > F
trt	3	61892	20631	Var(Residual) + Q(trt)	MS(Residual)	4	81.18	0.0005
Residual	4	1016.500000	254.125000	Var(Residual)

Table 3: Least Square Estimate of Treatments.

Least Squares Means									
Effect	trt	Estimate	Standard Error	DF	t Value	Pr > t	Alpha	Lower	Upper
trt	trt1	1246.00	11.2722	4	110.54	<.0001	0.05	1214.70	1277.30
trt	trt2	1264.00	11.2722	4	112.13	<.0001	0.05	1232.70	1295.30
trt	trt3	1446.00	11.2722	4	128.28	<.0001	0.05	1414.70	1477.30
trt	trt4	1411.50	11.2722	4	125.22	<.0001	0.05	1380.20	1442.80

Table 4: Treatment Comparisons.

Differences of Least Squares Means										
Effect	trt	_trt	Estimate	Standard Error	DF	t Value	Pr > t	Adjustment	Adj P	Alpha
trt	trt1	trt2	-18.0000	15.9413	4	-1.13	0.3220	Tukey	0.6939	0.05
trt	trt1	trt3	-200.00	15.9413	4	-12.55	0.0002	Tukey	0.0008	0.05
trt	trt1	trt4	-165.50	15.9413	4	-10.38	0.0005	Tukey	0.0017	0.05
trt	trt2	trt3	-182.00	15.9413	4	-11.42	0.0003	Tukey	0.0012	0.05
trt	trt2	trt4	-147.50	15.9413	4	-9.25	0.0008	Tukey	0.0026	0.05
trt	trt3	trt4	34.5000	15.9413	4	2.16	0.0964	Tukey	0.2747	0.05

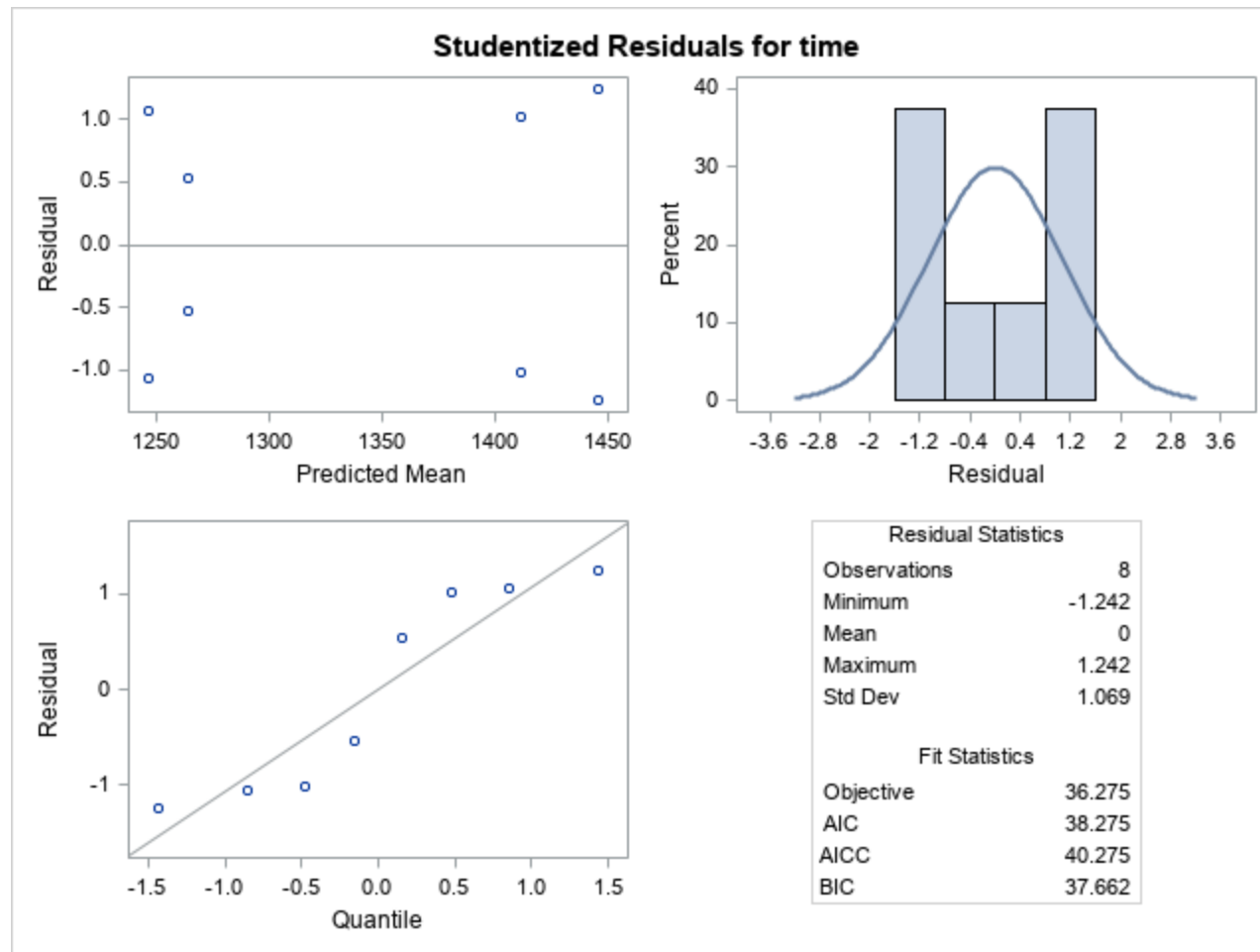


Figure 1: Studentized Residuals Analysis.