1. **First fit Full model with SAS Proc Reg:**

**proc** **reg**;

model personal=outdoor home time\_out;

**run**;

| **Analysis of Variance** | | | | | |
| --- | --- | --- | --- | --- | --- |
| **Source** | **DF** | **Sum of Squares** | **Mean Square** | **F Value** | **Pr > F** |
| **Model** | 3 | 5034.90667 | 1678.30222 | 9.92 | <.0001 |
| **Error** | 60 | 10148 | 169.13652 |  |  |
| **Corrected Total** | 63 | 15183 |  |  |  |

1. **proc** **reg**;

model personal=time\_out;

**run**;

| **Analysis of Variance** | | | | | |
| --- | --- | --- | --- | --- | --- |
| **Source** | **DF** | **Sum of Squares** | **Mean Square** | **F Value** | **Pr > F** |
| **Model** | 1 | 574.49202 | 574.49202 | 2.44 | 0.1235 |
| **Error** | 62 | 14609 | 235.62268 |  |  |
| **Corrected Total** | 63 | 15183 |  |  |  |

Suppose we would like to jointly test effects of outdoor and home, or H0: beta1 = beta2 = 0. Below is the F-statistic produced by SAS code:

**proc** **reg** data=ozone;

model personal= outdoor home time\_out;

test outdoor=**0**, home=**0**;

**run**;

| **Source** | **DF** | **Mean Square** | **F Value** | **Pr > F** |
| --- | --- | --- | --- | --- |
| **Numerator** | 2 | 2230.20733 | 13.19 | <.0001 |
| **Denominator** | 60 | 169.13652 |  |  |

Next let’s use SSE from reduced and full model to calculate F-statistics:

F= =13.19 which matches with the highlighted blue # above.

To test H0: beta0 = beta1=beta2=beta3=0, we get the following ANOVA tabel

| **Source** | **DF** | **Mean Square** | **F Value** | **Pr > F** |
| --- | --- | --- | --- | --- |
| **Numerator** | 4 | 10129 | 59.89 | <.0001 |
| **Denominator** | 60 | 169.13652 |  |  |

from

**proc** **reg** data=ozone;

model personal= outdoor home time\_out;

test intercept = **0**, outdoor=**0**, home=**0**, time\_out=**0**;

**run**;

Next let’s use SSE from reduced and full model to calculate the F-test statistics. To do so, we have to first run intercept only model first and get its associated ANOVA table:

**proc** **glm** data=ozone;

model personal=;

**run**;

| **Source** | **DF** | **Sum of Squares** | **Mean Square** | **F Value** | **Pr > F** |
| --- | --- | --- | --- | --- | --- |
| **Model** | 1 | 35481.84414 | 35481.84414 | 147.23 | <.0001 |
| **Error** | 63 | 15183.09796 | 241.00155 |  |  |
| **Uncorrected Total** | 64 | 50664.94210 |  |  |  |



F =  = 59.89 which matches with the highlighted yellow # above.