Homework Solutions
Applied Regression Analysis

WEEK 6

Exercise One

Using a two-sample t-test, determine whether the two SOFA Score groups differ significantly with respect to ICUAP (as measured by *max_grip*).

> Type "ttest max_grip, by(sofall)" in the command window to get the output shown below. The "by(sofall)" command is used to specify the two groups on which we are conducting the t-test.

```
.  ttest max_grip, by(sofa11)

Two-sample t test with equal variances
--------------------------------------------------------------------------------
   Group |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+----------------------------------------------------------------------
       0 |     125       15.14    1.241118    13.87612    12.68348     17.59652
       1 |      12    6.166667    2.138512    7.408022    1.459834      10.8735
---------+----------------------------------------------------------------------
combined |     137    14.35401    1.166686    13.65571    12.04682     16.66121
---------+----------------------------------------------------------------------
    diff |            8.973333    4.069572                 .924972     17.02169
--------------------------------------------------------------------------------
    diff = mean(0) - mean(1)                                   t =    2.2050
Ho: diff = 0                                   degrees of freedom =       135

   Ha: diff < 0                   Ha: diff != 0                  Ha: diff > 0
 Pr(T < t) = 0.9854         Pr(|T| > |t|) = 0.0291          Pr(T > t) = 0.0146
```

> The two sample t-test indicates that the two groups differ significantly (p = .0291) with respect to *max_grip*. In fact, we see that the mean strength of patients with SOFA scores less than 11 is 15.14 whereas it's only 6.7 for patients with SOFA scores greater than or equal to 11.

> **NOTE: We used the two sided alternative hypothesis test**.

WEEK 6

Exercise Two

Perform the same analysis from Exercise One (i.e., 2 sample t-test) using a regression analysis.

> In order to perform a regression analysis on the data set, type "regress max_grip sofall" in the command window.
>
> Obtain the p-value from the RHS (right hand side) of the output below or from the column next to the t statistic in the table.
>
> p-value of 0.0291 not only indicates that the model is significantly different from the naïve model, but it also indicates that the two groups of SOFA scores differ significantly with respect to max_grip.

```
. regress max_grip sofa11

      Source |       SS       df       MS              Number of obs =     137
-------------+------------------------------           F(  1,   135) =    4.86
       Model |  881.613625     1   881.613625          Prob > F      =  0.0291
    Residual |  24479.4667   135   181.329383          R-squared     =  0.0348
-------------+------------------------------           Adj R-squared =  0.0276
       Total |  25361.0803   136   186.478532          Root MSE      =  13.466

------------------------------------------------------------------------------
    max_grip |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      sofa11 |  -8.973333   4.069572    -2.20   0.029    -17.02169   -.924972
       _cons |      15.14   1.204423    12.57   0.000     12.75802   17.52198
------------------------------------------------------------------------------
```