Homework Solutions
Applied Regression Analysis

WEEK 3

Exercise Two
Use the ANOVA tables to perform the F test for the significance of each straight-line regression.

For each of the following, we are testing whether the slope coefficient is equal to zero. In other words, we are testing if the independent variable contributes significantly to the model. Notice that, because there is only one independent variable in the model, the F-test for the overall model yields the same significance as the t-test for the slope coefficient.

Looking at SBP (Y) on SMK (X)

$$H_o : \beta_1 = 0$$
$$H_A : \beta_1 \neq 0$$

```
. regress sbp smk

    Source |       SS       df       MS              Number of obs =      32
-----------+------------------------------           F(  1,    30) =    1.95
     Model | 393.098162       1   393.098162          Prob > F      =  0.1723
  Residual | 6032.87059      30   201.095686          R-squared     =  0.0612
-----------+------------------------------           Adj R-squared =  0.0299
     Total | 6425.96875      31   207.289315          Root MSE      =  14.181

------------------------------------------------------------------------------
       sbp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-----------+------------------------------------------------------------------
       smk |   7.023529   5.023498     1.398   0.172    -3.235823    17.28288
     _cons |      140.8   3.661472    38.454   0.000     133.3223    148.2777
```

With F=1.95 and p=0.1723, we fail to reject the null hypothesis. There is not sufficient evidence to conclude that there is a significant straight-line relationship between SBP and SMK.

Looking at SBP (Y) on QUET (X)

```
. regress sbp quet

    Source |       SS       df       MS              Number of obs =      32
-----------+------------------------------           F(  1,    30) =   36.75
     Model | 3537.94585       1   3537.94585          Prob > F      =  0.0000
  Residual | 2888.0229       30   96.2674299          R-squared     =  0.5506
-----------+------------------------------           Adj R-squared =  0.5356
     Total | 6425.96875      31   207.289315          Root MSE      =  9.8116

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       sbp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-----------+------------------------------------------------------------------
      quet |   21.49167   3.545147     6.062   0.000     14.25151    28.73182
     _cons |   70.57641   12.32187     5.728   0.000      45.4118    95.74102
------------------------------------------------------------------------------
```

With F=36.75 and p<0.0001, we reject the null hypothesis. There is sufficient evidence to conclude that there is a significant straight-line relationship between SBP and QUET.