HW 3
STAT 672, Summer 2015

(10 points (2 points for each part, and extra credit possibility for part (e))) For this problem you can just merely submit the answers requested for parts (a) through (d), writing them somewhere (easily found) on the sheet of paper submitted for your plot for part (e).

Use R to read in a small data set containing the heights, weights, and required lengths of heart catheters for a sample of 12 children. You can enter

```r
cath = read.table("http://mason.gmu.edu/~csutton/HeartCatheter.dat", header=TRUE)
cath
attach(cath)
```
to read in and look at the data, and the `attach(cath)` will then allow you the use the variables `ht`, `wt`, and `length` instead of having to type `cath$ht`, `cath$wt`, and `cath$length`.

(a) Fit a linear regression model using `length` as the response, and `ht` and `wt` as predictors, and give the p-value, rounded to only one significant digit that results from an F test of the null hypothesis that both of the predictor coefficients are equal to 0. (You should get a rather small p-value for the F test even though both of the t test p-values for the tests about the individual coefficients are rather large.)

(b) Based on the regression fit requested in part (a), which of the two predictors has the lower t test p-value, and what is it (rounded to the nearest hundredth)?

(c) Again, based on the same fit, what is the value of $R^2$ (labeled Multiple R-squared on the output produced by the `summary` function, when applied to the object you created using the `lm` function). Go ahead and give four significant digits for $R^2$. (Unlike the p-values, $R^2$ isn’t approximate due to the violations of the normality assumption.)

(d) Now fit a simple regression model using `wt` as the single predictor, and report the value of $R^2$. (Again, use four significant digits. You should be able to see that this value is only a little lower than the one requested in part (c). (This is due to the strong correlation of the `ht` and `wt` values. Using `cor(ht,wt)` produces a sample correlation close to 0.96.) You can also note that the p-value corresponding to `wt` is highly significant in the simple regression fit.)

(e) Give a scatter plot of `length` against `wt`, and also use `abline` to include a plot of the fitted regression function on the scatter plot. (I’ll give you a bonus point if you plot the data points in blue and the fitted regression function in red, keeping the axes and labels in black.)