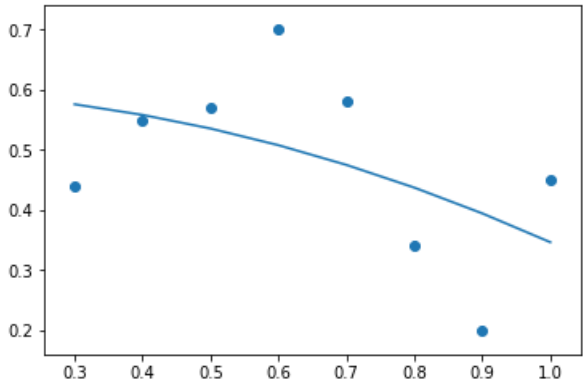
```
Python 3.6.5 |Anaconda, Inc.| (default, Mar 29 2018, 13:32:41) [MSC v.1900 64 bit (AMD64)]
Type "copyright", "credits" or "license" for more information.

IPython 6.4.0 -- An enhanced Interactive Python.

In [1]: runfile('C:/Users/hoops/OneDrive/Documents/School/ME EN 2550 Statistics and
Probability/HW8/HW8.py', wdir='C:/Users/hoops/OneDrive/Documents/School/ME EN 2550
Statistics and Probability/HW8')
B1
b)
```



a)

OLS Regression Results

Dep. Variable:	viscosity	R-squared:	0.269
Model:	OLS	Adj. R-squared:	0.147
Method:	Least Squares	F-statistic:	2.210
Date:	Tue, 16 Apr 2019	Prob (F-statistic):	0.188
Time:	15:39:10	Log-Likelihood:	5.2642
No. Observations:	8	AIC:	-6.528
Df Residuals:	6	BIC:	-6.370
Df Model:	1		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
Intercept	0.5986	0.095	6.269	0.001	0.365	0.832
np.power(ratio, 2)	-0.2523	0.170	-1.487	0.188	-0.668	0.163

Omnibus:	0.731	Durbin-Watson:	1.510
Prob(Omnibus):	0.694	Jarque-Bera (JB):	0.528
Skew:	-0.085	Prob(JB):	0.768
Kurtosis:	1.753	Cond. No.	4.13

Warnings:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

B2
a)

```
                            OLS Regression Results
==============================================================================
Dep. Variable:           satisfaction   R-squared:                       0.904
Model:                            OLS   Adj. R-squared:                  0.884
Method:                 Least Squares   F-statistic:                     46.87
Date:                Tue, 16 Apr 2019   Prob (F-statistic):           6.95e-10
Time:                        15:39:10   Log-Likelihood:                -82.062
No. Observations:                  25   AIC:                             174.1
Df Residuals:                      20   BIC:                             180.2
Df Model:                           4
Covariance Type:            nonrobust
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
Intercept    143.8672      6.044     23.804      0.000     131.260     156.474
age           -1.1172      0.138     -8.075      0.000      -1.406      -0.829
severity      -0.5862      0.136     -4.324      0.000      -0.869      -0.303
surgmed        0.4149      3.008      0.138      0.892      -5.859       6.689
anxiety        1.3064      1.084      1.205      0.242      -0.955       3.568
==============================================================================
Omnibus:                        4.082   Durbin-Watson:                   2.102
Prob(Omnibus):                  0.130   Jarque-Bera (JB):                2.355
Skew:                          -0.665   Prob(JB):                        0.308
Kurtosis:                       3.701   Cond. No.                         297.
==============================================================================

Warnings:
[1] Standard Errors assume that the covariance matrix of the errors is correctly
specified.
```

b)

```
Standard error of regression coefficents:
Intercept    6.043698
age          0.138342
severity     0.135556
surgmed      3.007787
anxiety      1.084055
dtype: float64
```

c) Not all the model parameters are estimated with the same precision. This is because all parameters are fit to a single model and thus the predictors will have varying standard error values/precision

B3

a)

```
                            OLS Regression Results
==============================================================================
Dep. Variable:                      y   R-squared:                       0.852
Model:                            OLS   Adj. R-squared:                  0.768
Method:                 Least Squares   F-statistic:                     10.08
Date:                Tue, 16 Apr 2019   Prob (F-statistic):            0.00496
Time:                        15:39:10   Log-Likelihood:                -43.397
No. Observations:                  12   AIC:                             96.79
Df Residuals:                       7   BIC:                             99.22
Df Model:                           4
Covariance Type:            nonrobust
```

```
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
Intercept   -123.1312    157.256     -0.783      0.459    -494.983     248.720
x1             0.7573      0.279      2.713      0.030       0.097       1.417
x2             7.5188      4.010      1.875      0.103      -1.964      17.001
x3             2.4831      1.809      1.372      0.212      -1.795       6.762
x4            -0.4811      0.555     -0.867      0.415      -1.794       0.832
==============================================================================
Omnibus:                        2.436   Durbin-Watson:                   1.808
Prob(Omnibus):                  0.296   Jarque-Bera (JB):                1.069
Skew:                          -0.288   Prob(JB):                        0.586
Kurtosis:                       1.656   Cond. No.                     6.82e+03
==============================================================================

Warnings:
[1] Standard Errors assume that the covariance matrix of the errors is correctly
specified.
[2] The condition number is large, 6.82e+03. This might indicate that there are
strong multicollinearity or other numerical problems.
b)
Standard error of regression coefficents:
Intercept    157.256058
x1             0.279090
x2             4.010121
x3             1.809386
x4             0.555174
dtype: float64
Not all the model parameters are estimated with the same precision.  This is because all
parameters are fit to a single model and thus the predictors will have varying standard
error values/precision
c)
The predicted power consumption for a month with the given values is : 290.442068
dtype: float6



C:\Users\hoops\Anaconda3\lib\site-packages\scipy\stats\stats.py:1394: UserWarning:
kurtosistest only valid for n>=20 ... continuing anyway, n=8
  "anyway, n=%i" % int(n))
C:\Users\hoops\Anaconda3\lib\site-packages\scipy\stats\stats.py:1394: UserWarning:
kurtosistest only valid for n>=20 ... continuing anyway, n=12
  "anyway, n=%i" % int(n))

In [2]:
```