Estimating the production technology of scoring well on ECO 610 exams

Output = exam score on a scale of 0 to 100

Inputs:

Hours = hours spent studying for the exam
Classes = classes attended prior to the exam
GPA = undergraduate grade point average
GMAT = score on the GMAT exam

Hypothesized functional form of the production technology is Cobb-Douglas:

$$Q = A \cdot Hours^{\beta} \cdot Classes^{\gamma} \cdot GPA^{\delta} \cdot GMAT^{\varepsilon}$$

Parameter estimates from regression analysis:

Ln A = -.8972, so $A = e^{-.8972} = .4077$
$\beta = .0614$
$\gamma = .3971$
$\delta = .2095$
$\varepsilon = .6668$

Marginal product of an additional hour spent studying:

$$MP_{Hours} = \partial Q/\partial Hours = \beta \cdot A \cdot Hours^{\beta-1} \cdot Classes^{\gamma} \cdot GPA^{\delta} \cdot GMAT^{\varepsilon}$$

Evaluated at the sample means for Hours, Classes, GPA, and GMAT:

$$MP_{Hours} = (.0614)(.4077)(.1036)(1.87)(1.29)(71.3) = .45$$

In words, another hour spent studying for the exam would have increased the exam score of the average student by less that half of a point.

Marginal product of attending an additional class:

$$MP_{Classes} = \partial Q/\partial Classes = \gamma \cdot A \cdot Hours^{\beta} \cdot Classes^{\gamma-1} \cdot GPA^{\delta} \cdot GMAT^{\varepsilon}$$

Evaluated at the sample means for Hours, Classes, GPA, and GMAT:

$$MP_{Hours} = (.3971)(.4077)(1.16)(.39)(1.29)(71.3) = 6.66$$

In words, attending another class would have increased the exam score of the average student by over six and one-half points.

	test score	hours studying	classes attended	undergrad GPA	GMAT
Mean	81.24615385	11.17538462	4.846153846	3.372769231	600.2153846
Standard Error	1.605434097	0.803412286	0.048934656	0.048422474	7.442972043
Median	84	10	5	3.4	600
Mode	87	10	5	3.3	600
Standard Deviation	12.94342349	6.47731693	0.394523812	0.390394463	60.00715903
Sample Variance	167.5322115	41.95563462	0.155649038	0.152407837	3600.859135
Kurtosis	0.327675663	1.573833704	8.933500232	-1.164010809	0.897858528
Skewness	-0.817773996	1.190397842	-2.931287159	-0.096751768	-0.076132979
Range	58	28.6	2	1.3	310
Minimum	42	1.4	3	2.7	460
Maximum	100	30	5	4	770
Sum	5281	726.4	315	219.23	39014
Count	65	65	65	65	65

	test score	hours studying	classes attended	undergrad GPA	GMAT
test score	1				
hours studying	0.079839708	1			
classes attended	0.209480836	0.206383477	1		
undergrad GPA	0.309484721	0.009950921	0.138242303	1	
GMAT	0.324582245	-0.406717735	-0.209118367	0.334811826	1

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.461400126
R Square	0.212890076
Adjusted R Square	0.160416081
Standard Error	0.161727654
Observations	65

ANOVA

	df	SS	MS	F	Significance F
Regression	4	0.424463014	0.106115753	4.057058664	0.005617101
Residual	60	1.569350047	0.026155834		
Total	64	1.99381306			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Low
Intercept	-0.897203788	1.597825572	-0.561515477	0.576537623	-4.093329763	2.298922186	-4.(
lnHOURS	0.06136971	0.039689397	1.54624947	0.127302988	-0.01802088	0.140760299	-0
lnCLASSES	0.397127911	0.227791236	1.743385381	0.086388645	-0.058522255	0.852778077	-0.(
lnGPA	0.209493106	0.188836724	1.109387523	0.27168981	-0.16823646	0.587222671	-0
lnGMAT	0.666769779	0.240087407	2.777195965	0.007305595	0.186523617	1.147015941	0.'