Problem Set 8

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1 Question 9: lm() Regression Table

Table 1:

	Dependent variable:
	Y
X1	1.501***
	(0.002)
X2	−0.996***
	(0.002)
X3	−0.249***
	(0.002)
X4	0.747***
	(0.002)
X5	3.502***
	(0.002)
X6	−1.999***
	(0.002)
X7	0.501***
	(0.002)
X8	0.999***
	(0.002)
X9	1.253***
	(0.002)
X10	1.999***
	(0.002)
Observations	100,000
R^2	0.991
Adjusted R^2	0.991
Residual Std. Error	0.500 (df = 99990)
F Statistic	1,080,712.000*** (df = 10; 99990)
Note:	*p<0.1; **p<0.05; ***p<0.01

1.1

The True Betas and Estimated Betas are very similar, as you can see looking at the two tables there is a slight difference.

Table 2: True Values of Beta

Index	Value
1	1.5
2	-1.0
3	-0.25
4	0.75
5	3.5
6	-2.0
7	0.5
8	1.0
9	1.25
10	2.0

2 Question 5: OLS estimate - Closed Form Solution

2.1

Again, looking at the True Values of Beta in Table 2 and the estimated Beta Values in Table 3, there is only a slight difference.

Table 3: OLS Estimate (beta_ols)

Index	Value
1	1.5005793
2	-0.9956182
3	-0.2486498
4	0.7471903
5	3.5017669
6	-1.9994365
7	0.5011339
8	0.9987400
9	1.2528300
10	1.9993846

3 Question 7: Compare Beta Estimates using the L-BFGS algorithm and Nelder-Mead algorithm.

3.1

The Beta Estimates generated using the L-BFGS Algorithm (Table 4) are also very similar to the true Beta Values (Table 2).

3.2

The estimates from the Nelder-Mead algorithm are somewhat different from the true values of beta and the estimates obtained using other methods

Table 4: L-BFGS Algorithm Estimates

Index	Value
1	1.5005793
2	-0.9956182
3	-0.2486498
4	0.7471903
5	3.5017669
6	-1.9994365
7	0.5011339
8	0.9987400
9	1.2528300
10	1.9993846

Table 5: Nelder-Mead Algorithm Estimates

Index	Value
1	0.9767063
2	-0.9680386
3	-0.1361704
4	1.1277353
5	3.2668671
6	-2.1447235
7	0.5663044
8	1.0422382
9	1.4966523
10	2.3011765