Problem Set 8

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Problem 5

Table 1:

	Beta = (X'X)X'Y
X1	1.5010518
X2	-1.0008296
X3	-0.251648
X4	0.7490406
X5	3.5005531
X6	-2.0008185
X7	0.4987148
X8	1.0028269
X9	1.2465102
X10	2.0010012

The output is given in Table 1 above. My answers are insanely close to the true values in problem 4. All answers are, at the very least, 0.1 units away from the true values.

Problem 6

My output is given in Table 2 below.

Problem 7

My output is given in Table 3 below. My answers definitely differ. Based on my results, it seems that the Nelder-Mead method does not give as accurate of predictions, suggesting that the LBFGS algorithm is superior for predicting OLS.

Table 2:

	Gradient Descent
X1	4.448892E-07
X2	-2.998793E-07
X3	-6.913668E-08
X4	2.269598E-07
X5	1.049007E-06
X6	-5.912512E-07
X7	1.508233E-07
X8	3.080737E-07
X9	3.697497E-07
X10	6.041035E-07

Table 3:

	L-BFGS	Nelder-Mead
X1	1.4870566	1.1770684
X2	-1.0023564	-0.9164661
X3	-0.2310916	-0.1601914
X4	0.7586206	0.9990248
X5	3.5063399	3.0740315
X6	-1.9762762	-2.2658981
X7	0.5041318	0.5961485
X8	1.0297464	0.8454130
X9	1.2359005	1.4415925
X10	2.0192356	2.0331941

Problem 8

Table 4: Add caption

	MLE
X1	1.523519
X2	-1.01446
X3	-0.26889
X4	0.7484
X5	3.54888
X6	-2.04097
X7	0.496395
X8	1.007979
X9	1.259518
X10	2.017936
	-0.40949

My output is given in Table 4.

Problem 9

My output from the "modelsummary" package is given below. The values listed are extremely close to the true values. Most of the estimates are within 0.001 units away from the true value, with the exception of X3 (which is 0.002 away), X8 (which is 0.003 away), and X9 (which is 0.003 away).

	(1)
X1	1.501
	(0.002)
X2	−1.001
	(0.002)
X3	−0.252
	(0.002)
X4	0.749
	(0.002)
X5	3.501
	(0.002)
X6	−2.001
	(0.002)
X7	0.499
	(0.002)
X8	1.003
	(0.002)
X9	1.247
	(0.002)
X10	2.001
	(0.002)
Num.Obs.	1×10^5
R2	0.991
R2 Adj.	0.991
AIC	145 143.6
BIC	145 248.3
Log.Lik.	−72 560.811
RMSE	0.50