PS8$_T$*hatcher*

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1 Question 5

How does your estimate compare to the true value of Beta in (1)?

My estimate was 1.500, -.991, -.247, .744, 3.504, -1.998, .502, .997, 1.256, 1.999, which is pretty close to the original values of 1.5, -1, -.25, .75, 3.5, -2, .5, 1, 1.25, and 2. Some of the estimates were a little more, some were a little less.

2 Question 6

How does your estimate using gradient descent compare to the true value of Beta in (1)?

Again, it is pretty close. The values I got were 1.501, -.991, -.247, .744, 3.504, -1.999, .502, .997, 1.256, 1.999. These were not only close to the true value of beta, but also very close to the values found in Question 5.

3 Question 7

Do your answers for L-BFGS and Nelder-Mead differ?

The L-BFGS and Nelder-Mead actually gave pretty different answers, with L-BFGS giving 1.501, -.991, -.247, .744, 3.504, -1.999, .502, .997, 1.256, and 1.999 while Nelder-Mead was farther off with 1.427, -.485, -.468, .599, 3.385, -2.203, .474, 1.587, .670, .982.

How do these answers compare to the true value of Beta in (1)?

The L-BFGS is failry close to the true value, however the Nelder-Mead is quite far off.

4 Question 9

How similar is the lm() estimate to the true value of Beta in (1)?

The values for the built in lm() function I got are 1.501, -.991, -.247, .744, 3.503, -1.999, .502, .998, 1.256, 1.999. So they are pretty in line with the rest of the methods (except Nelder-Mead) and are close to the true value of beta.

Table 1:

	Dependent variable:
	Y
X1	1.501^{***}
	(0.002)
X2	-0.991^{***}
	(0.003)
X3	-0.247^{***}
	(0.003)
X4	0.744^{***}
	(0.003)
X5	3.504^{***}
	(0.003)
X6	-1.999^{***}
	(0.003)
X7	0.502^{***}
	(0.003)
X8	0.997^{***}
	(0.003)
X9	1.256^{***}
	(0.003)
X10	1.999^{***}
	(0.003)
Observations	100,000
R^2	0.971
Adjusted R^2	0.971
Residual Std. Error	0.500 (df = 99990)
F Statistic	$338{,}240.000^{***}$ (df = 10; 99990)
Note:	*p<0.1; **p<0.05; ***p<0.01