Psychology 5741 (Neuroscience)
Lab Exercise: Multiple Regression

Data Set: Dose Response 1
Background: This is the same data set as Dose Response 1 in the lab exercises for Simple Regression.
Your Task: Do a polynomial regression and compare the results with the linear regression.

Data Set: Dose Response 2
Background: This is the same data set as Dose Response 2 in the lab exercises for Simple Regression.
Your Task: Do a polynomial regression and compare the results with the linear regression.

Data Set: Stimulation
Background: This study examined pressure in the carotid artery before and after electrical stimulation of a certain region of rat brain. Both control and experimental animals were fitted with electrodes and a pressure clamp on the carotid artery. Electrical stimulation was administered to only the experimental animals.
Your Task: Write up the results.

Data Set: Recovery
Background: The study examined the administration of a drug to test recovery from experimentally induced brain damage in the hippocampus. Rats were trained on a conditioning task until criterion (75% response to the conditioned stimulus) was reached. Surgery was then performed and lesions were created in the hippocampus by microinjection of a radioactively labeled chemical. After recovery from anesthesia, the rats were randomly assigned to control and experimental groups. Experimental animals were administered an active drug suspected of diminishing brain damage while control animals were given just the vehicle for drug administration. Rats were then tested on the conditioning task and sacrificed. Autoradiograms were performed on slices of the hippocampus and a quantitative index was constructed for each animal of the volume of the lesion.
Your Task: Do three different regressions here. First, predict the posttest results by using only the dummy code. Second, predict the posttest using the dummy code and pretest scores. Finally, predict the posttest variable using the dummy code, the pretest scores, and the lesion volume. Explain why—and not just how—the three results differ.
**Data Set: Open Field**  
**Background:**  
After a pharmaceutical company isolates potential anxiolytic drugs, it tests for behavioral efficacy using mice in an open field. This data set gives baseline and posttest data after the administration of an active drug or saline vehicle. Low scores on the open field test are associated with low anxiety.  
**Your Task:** Do three analyses here. First, test for mean differences in the two groups for the baseline. Second, test for mean differences between the two groups on posttest. For the third test, use regression to predict the posttest activity using both the dummy code and pretest activity variables. Write up the results as they should appear in the Results section of a journal article. Then explain why the inclusion of pretest activity in the regression results in a significant finding but ignoring pretest activity results in a nonsignificant finding for the drug effect.

**Data Set: Cortical Blood Flow**  
**Background:**  
Radioactive xenon was injected into the carotid artery of human volunteers. Scintillation counters were placed around the head to measure regional blood flow. Blood flow was measured at baseline and then after the subject was instructed to image moving his/her right index finger. The data set gives the baseline and task blood flow in two different brain regions, an area in the frontal cortex and an area in the sensorimotor cortex.  
**Your Task:** Write up the results.  