BONUS PROBLEM SET

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1. You have a dataset of 1,000 women over the age of 30, and you want to run a regression where the dependent variable is the number of children that each woman has. You want to see if this depends on a woman's education, age, and a dummy that equals 1 if a woman is married:

$$children = \alpha_0 + \alpha_1 ed + \alpha_3 age + \alpha_2 marital + u$$

Furthermore, you have 4 racial groups of women in your data. Using dummy variables and interactions of dummy variables, you run a regression that allows for different intercepts and slopes for each racial group (you also allow the affect of marriage to vary for each racial group).

You then want to test whether the regression lines estimated for each racial group are different, or whether the data can be explained by a regression that restricts intercepts and slopes to be the same for all racial groups. You recall that a Chow test is suitable for this. What are the relevant numerator and denominator degrees of freedom for a Chow test in this case?

2. Consider a variable x that takes on the value 3 with probability (n – 1) / n, and takes on zero otherwise. What is the probability limit of x as n goes to infinity? For a *given* n, what is the expected value of x?

3. True/False: the assumption of homoskedasticity is needed for OLS estimates to be consistent.

4. True/False: if an estimator is unbiased, then it is consistent too.

5. True/False: if our unobservable term u is not normally distributed, then for a given set of x variables it follows that the dependent variable y will not be normally distributed either.