FINAL EXAM ECON 211B (WINTER 2016)

Name: _____

1. You are asked to determine if the tutoring program for UCSC undergrads improves class performance in Econometrics. You have a dataset with the students grade in Econometrics, GPA prior to that quarter, SAT scores, and how many tutoring sessions the student went to. The tutoring program is optional and 40 percent of students took advantage of it.

    (a) What is the first thing you should do to assess if the two groups are comparable? What do you think it will reveal?

    (b) What conditions has to be met for the regression $grade_i = \beta_0 + \beta_1 tutoring_i + \beta_2 GPA_i + \beta_3 SAT_i + \epsilon_i$ to get us an unbaised estimate of the causal effect of tutoring? (please write it in terms of potential outcomes and words).

(c) Do you think the condition from part (b) is met in this context? Why or why not?

2. If the correct model is $y_i = \beta_0 + \beta_1 x_{1,i} + \beta_2 x_{2,i} + \epsilon_i$ but you ommit the variable $x_{2,i}$ from your regression because you are not aware it is important and estimate $y_i = \beta_0 + \beta_1 x_{1,i} + \epsilon_i$ you will have ommitted variables bias. Please derive the formula for the ommitted variables bias. Hint: Start with $\widehat{\beta_1} = cov(y_i, x_{1,i})/var(x_{1,i})$ and plug in what y_i equals.

3. You are trying to determine if putting into effect a minumum wage reduces employment rates. The minimum wage was imposed at different times in different states. You create an indicator variable $Min_{s,t}$ which takes on a value of 1 if a state s has a minimum wage in effect in year t. Employment rates are denoted by $Employ_{s,t}$ and you have data for all 50 states for a five year time period.

(a) If you estimate the regression $Employ_{s,t} = \beta_0 + \beta_1 Min_{s,t} + \epsilon_{s,t}$ what conditions have to be met for you to get a consistent estimate of the effect of the minimum wage on employment rates? Do you think they are likely to be met - be clear on what types of omitted variables will bias the estimates.

(b) As alternative to the approach in (a) you estimate the following model $Employ_{s,t} = \beta_1 Min_{s,t} + \alpha_s + \gamma_t + \epsilon_{st}$ where α_s are indicator functions for each state and γ_t are time period dummies. Under what conditions will you get consistent estimates of the effect of the minimum wage? What kinds of variables can cause bias in this regression model.

(c) In the model from part (b) an we treat the s*t observations in your sample as independent (which is what statistical packages do as a default) when we compute the standard error of β_1? Why or why not? If not what should you do to get the SE right?

(d) What refinement of the model in part (b) could you use if you think it takes a while for employment to adjust in response to the minimum wage and you want to estimate how rapid the response is?

4. You wish to estimate how much a one week job training program that teaches the employees of a call center how to deal with irate customers improves call center employees productivity. The firm you hire to run the experiment randomly selects 200 employees and tells them they are required to take a one week training program. The other 550 employees do not get the training. Unfortunately, of the 200 employees assigned to take the training 90 decided they were not going to take it and the union backed them on this so they did not take the training.

   (a) Please estimate and interpret the first stage.

   (b) The group assigned to treatment on average handles 79 calls per day in the week after the training ends. The group assigned to control handles 53 calls per day. Please compute and interpret the reduced form estimate (intention to treat). Do you think this estimate is unbiased?

(c) Please estimate and interpret the effect of getting the training under the plausible assumption that treatment effects are heterogeneuos in this context.

(d) What concerns do you have about the estimate in part (c)? Hint: Are the IV assumptions likely to be met: spillovers, monotonicity etc.?

(e) Your boss is pushing you to make a prediction as to how much making the one week training mandatory will increase productivity in the long term. What is your prediction and what are the two major caveats you need to bring to his attention.

(f) If you have three independent measures of productivity (calls, time to complete a call, satisfaction rating) and you estimate the effect of the treatment on all three what do you have to do when doing your significance testing. Please be specific.