This exam consists of 4 pages. Please make sure that you have all pages before beginning.
1. Answer **one** of the following questions:


2. In a version of the standard Phelps’ model of statistical discrimination, workers’ productivity $\theta$ is distributed normally with mean $\mu$ and standard deviation $\sigma$. Employers observe a signal $s = \theta + \epsilon$, where $\epsilon$ is distributed normally with mean 0 and standard deviation $\sigma_{\epsilon J}$, where $J = A, B$ denotes group identity (all variables are in logs so you don’t have to worry about wages and productivity being possibly negative). Many employers compete to attract workers by posting wages.

(a) Solve the model by specifying equilibrium wages for each group

(b) Assume you have a data set of United States workers with information on their wages and their race (black/white). Write the likelihood function of such sample assuming the data generates from the model in part (a). Are the parameters identified? Discuss.

(c) Now assume there are two types of employers: a proportion $\pi$ is prejudiced, and $1 - \pi$ is non-prejudiced. Prejudiced employers have a Becker-style preference against $B$ workers summarized by a discrimination coefficient $d$ interpreted as the psychic cost of hiring a $B$ worker, measured in dollars. Consider a one-period model where $B$ workers are randomly allocated to employers, and assume workers accept a wage offer equal to their expected productivity. Derive workers’ wages conditional on employer type.

(d) Assume that you **do not** have data on the employers’ type. Interpret employers’ type as “unobserved heterogeneity” and derive the likelihood function for the same data described in part (b). Discuss the identification of parameters $d$ and $\pi$.
Field Exam Questions in Health Economics (Carpenter)

Please answer all parts of all questions and mark the beginning of your answer with the corresponding letter: A), B), C), etc. Question H-1 (with parts A-I) is worth 30% of this half; Question H-2 (with parts A-G) is worth 40% of this half; and Question H-3 (with parts A-F) is worth 30% of this half. Be concise; do not go overboard. If you can answer the sub-question in one sentence, do so.

**Question H-1 (30% of this half).** Choose one of the following papers and answer all of the following questions in the context of the paper you chose.


**A)** What is the key causal question of interest from the paper you chose? What is (are) the treatment(s) and what is (are) the key outcome(s)? **B)** In the context of that particular paper, how would you describe the Fundamental Problem of Causal Inference (FPCI)? **C)** Suppose we just compared mean outcomes for people who got the treatment and people who didn’t get the treatment. Give a concrete example of an omitted variable that could bias this simple mean comparison in the context of the research question in the paper you chose. What direction would that likely bias be (up or down)? **D)** What would the perfect thought experiment to answer this causal question look like (describe in words)? Explain why this thought experiment would overcome the FPCI. **E)** Would such a true, classical experiment be feasible/implementable in practice? Why or why not? **F)** In the absence of that thought experiment, what quasi-experimental research design/approach does the author/do the authors take to address omitted variables? Describe the intuition behind the approach. **G)** What key pieces of evidence in the paper are provided to help convince the reader that the chosen approach adequately addresses omitted variables? **H)** What are the key findings in this paper? **I)** What, if any, are the critical limitations of the research paper?
**Question H-2 (40% of this half).** There is a great deal of interest in understanding whether student participation in Greek life (fraternities and sororities) exerts causal effects on college student drinking behaviors, in part because colleges and universities could implement policies that would reduce or eliminate opportunities to participate in Greek life (e.g., ban fraternities and sororities altogether, prohibit fraternities and sororities from residing in their chapter houses, etc.).  

A) Suppose you had data on college students with information on their Greek membership and their alcohol consumption. Why might simple comparisons of students who do and do not participate in Greek life fail to return the causal effect of Greek membership on alcohol consumption? Give at least three specific examples of unobserved heterogeneity that might be important.  

B) Now suppose you had panel data on college student drinking behavior and could observe some students joining and leaving Greek life, thus permitting you to identify a model with individual fixed effects. Write down a simple version of the estimating equation for such a model (defining what each variable is).  

C) Would the individual fixed effects address/absorb all of the confounding problems you identified in your answer to part (A)? Why or why not?  

D) Suppose your data also included information on whether the student’s parents also participated in Greek life when they were in college. You might consider instrumenting for a student’s Greek life participation with their parent’s Greek life participation. Do you think this would this be a valid instrument? Explain why or why not, paying particular attention to your guesses about both first stage validity and second stage excludability.  

E) Suppose your data also included information on the student’s GPA (in addition to Greek membership and alcohol consumption). As colleges typically require students to maintain a minimum GPA to participate in Greek life, you might consider using those GPA thresholds (which are also commonly used for scholarships, athletics, and ‘probation’ status) in a regression discontinuity (RD) framework to identify the causal effect of Greek membership on drinking behaviors. Write down a simple version of the estimating equation for such a model (defining what each variable is).  

F) Do you think this would be a good approach? Explain why or why not, paying particular attention to the usual advantages and drawbacks/challenges of RD.  

G) Which of the three strategies above do you think would come closest to/farthest from identifying the true causal effect of Greek life membership on alcohol consumption? Briefly explain.

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**Question H-3 (30% of this half).** Consider the 2010 paper by Currie, DellaVigna, Moretti, and Pathania in the *American Economic Journal – Economic Policy* titled “The Effect of Fast Food Restaurants on Obesity and Weight Gain” and the 2011 paper by Anderson and Matsa in the *American Economic Journal – Applied Economics* titled “Are Restaurants Really Supersizing America?”  

A) Both papers attempt to estimate the causal effects of fast food on obesity. What is the basic economic story/what are the mechanisms through which fast food restaurants might increase population weight and obesity?  

B) Explain why comparisons of obesity rates in places with versus without lots of fast food restaurants might lead to incorrect inferences about the
causal effects of fast food on obesity. C) These two papers take different approaches for identifying causal effects. Briefly describe the research design in Currie et al. and the research design in Anderson and Matsa. D) What are the key assumptions underlying each design? How believable are those assumptions? E) Briefly state the main finding of each paper. Do the findings of the two papers agree or disagree? Explain. Could both papers be right? Explain. F) Briefly explain what we mean by ‘internal validity’ versus ‘external validity’ of a research study. Which of these two papers in your view has the stronger internal validity? Which of these two papers in your view has the stronger external validity? Explain.