study questions for the final on 12/22.

The exam will have two questions. One will give you a choice between versions of 1 and 2 below, the other a choice between versions of 3 and 4. The versions on the final are likely to be shorter and simpler than what you see here. You may bring a sheet of notes.

1. Capitalists can run production projects in which labor produces corn. One unit of labor is required to set up a project; once the project is set up, x units of additional labor produce x units of corn, for any $x > 0$. There are N workers, each of whom has one unit of labor that she sells to capitalists for a corn wage w; if capitalists offer different wages, workers sell only to the capitalist who offers the highest wage. Capitalists act to maximize their corn profits, which they consume.

(a) Show that this economy has no competitive equilibrium. (Hint: First suppose that $w \geq 1$ and show that production is never profitable at any scale. Then suppose that $w < 1$ and show that no output level is profit-maximizing, since profits can always be increased by producing on a larger scale.)

(b) Suppose there's only 1 capitalist who maximizes profits given the constraint that she can employ no more than N workers. Find a wage w^* such that at w^* the capitalist achieves a maximum profit of 0 by employing the entire workforce.

(c) Now suppose there is free entry: Any of a large number of capitalists will try to hire workers and produce corn if she can make profits doing so. Say that a set of production and wage choices by incumbent capitalists is *sustainable* if no potential entrant could make positive profits by entering the market for corn. Show that the only sustainable situation has a single capitalist producing corn and offering a wage equal to w^*. (Hint: Show that if there are two or more incumbents making nonnegative profits, or one or more incumbents earning positive profits, an entrant could make positive profits by offering a slighter higher wage and stealing the entire workforce.)

(d) What happens to the sustainable wage w^* as the population of workers increases? (Hint: It's not a very good measure of the scarcity of labor.)

2. A risky production project that requires 1 unit of seed corn uses between 0 and 1 units of labor. If the project suceeds, you get a net product of R units of corn. If it fails, you get nothing. The project succeeds with probability $\pi(L) = L^{\frac{1}{2}}$ where L is the amount of labor effort that you devote to it. You have $k < 1$ units of seed corn and 1 unit of labor power.

(a) Suppose that I offer to loan you the $1 - k$ units of seed corn that you need for your project at an interest rate i. You choose an amount of labor L to spend on your project, and sell the rest, $1 - L$, at a wage w. Find the L that maximizes the expected value of your return plus your wages, and express it as a function of R, i, k, and w.

(b) Find the interest rate that maximizes my expected return on this loan given that you will make the labor choice described in (a).

(c) Suppose that I can make a certain return of .125 by some other investment. Let $R = .5$ and $w = .4$. Find a wealth level $k_{\min}$ such that I will refuse to lend to you if you have $k < k_{\min}$.

3. Here are three models of price formation that we've talked about this semester.

Model A. Traders pair off and exchange goods at ratios that make both traders better off; this process of pairing and exchange continues until all the traders have the same offer prices, which then constitute well-defined market prices.

Model B. All the traders are confronted with the same list of market prices. Each believes that she can carry out any transactions that she wants at those prices. It's supposed that some process of price adjustment leads to prices at which all the traders can actually carry out their desired transactions.

Model C. Each trader sets prices to maximize her payoffs given her beliefs about the amounts that she'll be able to buy and sell at those prices and her beliefs about the prices set by the other traders. It's supposed that some process of learning leads people to form correct beliefs.

Choose two of these models and compare their abilities to explain the emergence of market prices from exchange.

4. "For B to have power over A, it is sufficient that, by imposing or threatening to impose sanctions on A, B is capable of affecting A's actions in ways that advance B's interests, while A lacks this capacity with respect to B." (Samuel Bowles, *Microeconomics*, p. 345.)

(a) Consider the perfectly competitive equilibrium of a market economy with complete contracts. Does any pair of traders meet Bowles' sufficient condition for power?

(b) Consider an economy where labor contracts are incomplete because labor effort can't be observed. Use the model of unemployment as a labor-discipline device to explain how employers can exercise power over employees.