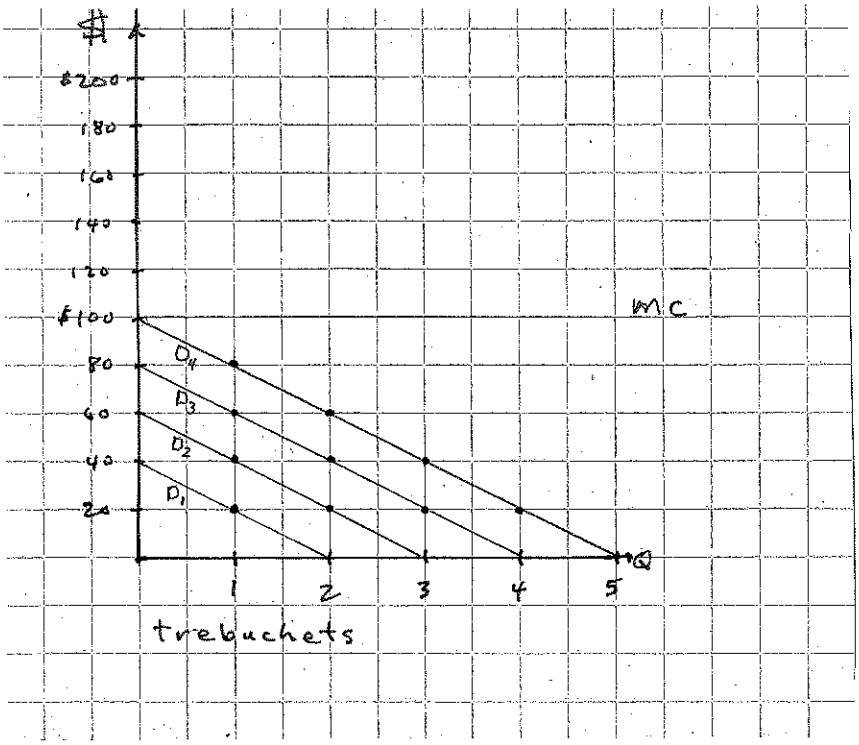
ECO 499
Midterm Exam
Fall 2015

Name: _____

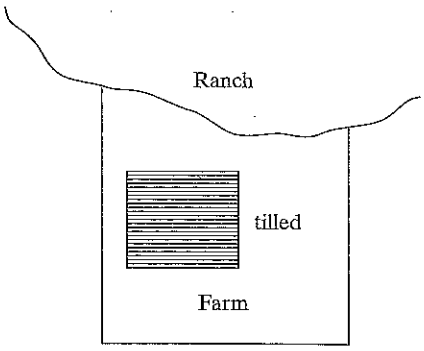
100 points total. Answer each question in the space provided, using the back of the sheet if necessary.

1. (20 pts.) Coal and natural gas are two sources of energy that can be found underneath the surface of the ground in Kentucky. Establishing ownership rights that incentivize the optimal rate of extraction may differ for these two resources, however. Explain the two general principles that can be used to solve the problem of establishing ownership, and then explain why the approach that works best for coal might not be best for natural gas.

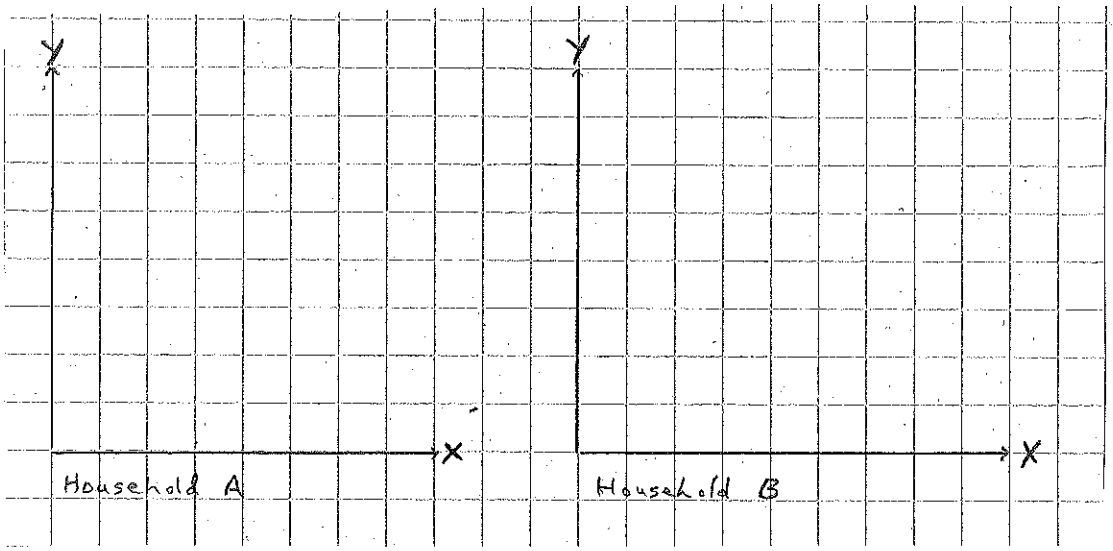
2. (20 pts.) Our island is regularly raised by pirates, who plunder and loot our coconuts, fish, and other possessions. We each individually build fences and install burglar alarms, but none of these efforts are particularly effective against pirates. The most effective pirate deterrent would be a trebuchet. There are four of us on the island, and our individual demands for trebuchets are illustrated below. Trebuchets cost $100 each to build. How many trebuchets will our island economy produce if private market allocation is relied upon? Is this efficient? What characteristics of trebuchets lead to this outcome? If you were appointed to be secretary of defense by the rest of us, how many trebuchets would you recommend that we produce? Explain your reasoning and illustrate your answer in the diagram.



3. (20 pts.) A rancher and a farmer live adjacent to one another, as illustrated below. The farmer grows corn on some of his land and leaves some of it uncultivated. The rancher runs cattle all over her land. The boundary between the ranch and the farm is clear, but there is no fence. From time to time the cattle wander onto the farmer's property and damage the corn, reducing the farmer's profits by $100 per year. The cost of installing and maintaining a fence around the farmer's cornfields is $50 per year, and the cost of installing a fence around the ranch is $75 per year. (a) The farmer decides to sue the rancher for the damage her cattle cause. The court decides in favor of the farmer, and enjoins the rancher's cattle from wandering onto the farmer's land and eating his corn. Will this decision lead to an inefficient outcome? Explain why or why not. (b) Suppose the two parties decide to merge and form one mega-farm. What approach will the merged firm take towards corn, cattle, and fences? Explain.



4. (20 pts.) A necessary condition for Pareto optimality is efficiency in exchange. Explain what is meant by efficiency in exchange, i.e. describe explicitly what it requires. Then explain and illustrate how competitive markets lead to efficiency in exchange. For your illustration, consider two representative households, A and B, having respective incomes I_A and I_B, consuming two goods, X and Y, and facing market prices P_X and P_Y.



5. (20 pts.) Exchanges between individuals involving private goods do not raise concerns about efficiency because voluntary exchanges never move scarce resources from higher-valued uses to lower-valued uses. When government uses its power of eminent domain to acquire property, however, inefficiencies may occur. Two cases involving government takings were *Kelo v. City of New London* and the acquisition of property by UK on Columbia Circle for the construction of Young Library. Describe the facts these cases, and discuss whether the above-mentioned concern about efficiency was a factor in each case.