ECON 201, Prof. Hogendorn: Hour Exam #2

1. True or false? If the law of diminishing marginal product did not hold, the world's food supply could be grown on a 100-acre farm. (Explain with reference to two factors, L=land and F=fertilizer.) (5 points)

2. Is it ever better for a perfectly competitive firm to produce output even though it is losing money? If so, when? (5 points)

3. Funkwalder UK has called for bids on a contract to produce 12,030 borchnagles. The two main British producers of borchnagles are Birmingham Borchnagle Ltd. and British Borchnagles. In Birmingham, labor costs £3 and capital costs £10. Birmingham Borchnagle's production function is

$$f(L, K) = 50\sqrt{LK} + 40K + 7L$$

   British Borchnagles's cost of producing 12,030 borchnagles is £1,500, both in the short run and the long run. The firms will keep trying to outbid each other by lowering their bids as long as they will not incur an outright loss from fulfilling the contract.

   (a) Suppose that in the short run, capital is fixed at $K = 25$. This makes the short-run total cost curve:

$$C(y|K) = 3\left(\frac{\sqrt{34500 + 28y} - 250}{14}\right)^2$$

   If the contract must be produced in the short run, who will win and how much will they bid? What is Birmingham's short-run average cost curve? Short-run marginal cost curve? (5 points)

   (b) What is Birmingham's long-run total cost curve? If the contract can be produced over the long run, who will win and how much will they bid? (5 points)

   (c) What is Birmingham's long-run average cost curve? Long-run marginal cost curve? (5 points)

4. Let demand be $X(p) = Ap^\epsilon$, where $\epsilon < 0$. Let supply be $S((1 - g)p) = d(1 - g)p$, where g represents a government tax on producers. The total government tax revenue is $gpX(p)$. We can assume $0 < g < 1$ and $d > 0$.

   (a) What is the equilibrium price and quantity? (5 points)

   (b) What is the government payout in equilibrium? (5 points)

   (c) Use derivatives to show conditions on g and ϵ such that an increase in the tax rate will reduce government revenue. (5 points for setup and beginning work, 5 points for finding conditions)

5. Take-home Question, do not try during exam: Show how to derive the short-run cost curve in question 3a. Assume that $y > 1000$. (2 points extra credit if handed in independently by class on Thursday)