

ECON 201, Prof. Hogendorn: Problem Set #7

1. Suppose the short-run production function (capital, K , is fixed) is $f(L|K) = 10L^{0.5}$. Capital costs \$10.
 - (a) Find the short-run cost function as a function of y and the wage of labor, w .
 - (b) If the price is $p = \$20$ and labor costs \$5, how much will be produced? How much labor will be hired?
 - (c) How low would the price have to be for the firm to shut down?
 - (d) How high would the wage have to be for the firm to shut down?
2. Suppose there are two oil-producing regions in the world, and in each one there are perfectly competitive producers. The factor price for extraction equipment is w , and the long-run average costs of one of these firms are

$$AC(y) = \sqrt{w}(1 + y^2)$$

There are 20 firms in the Middle East, and for them extraction equipment costs 400. There are 10 firms in Alberta who must pay 900 for extraction equipment.

- (a) Suppose the world needs an amount of oil equal to \hat{y} . What value of \hat{y} would result in a price of oil of \$25?
 - (b) What value of \hat{y} would result in a price of oil of \$32?
 - (c) What is the market supply curve for oil?
3. Suppose the daily demand curve for flounder at Cape May is given by

$$X(p) = 1600 - 600p$$

Suppose the supply of flounder is 1000 pounds, no matter what the price.

- (a) What is the equilibrium price? The equilibrium quantity?
- (b) Suppose the demand rises to $X'(p) = 2200 - 600p$. What is the equilibrium price? The equilibrium quantity?
- (c) Suppose demand is back to $X(p) = 1600 - 600p$ but now supply becomes variable with $S(p) = 800 + 200p$. What is the equilibrium price? The equilibrium quantity?
- (d) Again, suppose the demand rises to $X'(p) = 2200 - 600p$ but now with the new supply curve from part (c). What is the equilibrium price? The equilibrium quantity?
- (e) The change from (a) to (b) is different from the change from (c) to (d). Explain the difference with reference to the elasticity of supply.

4. Let demand be $X(p) = Ap^\epsilon$. Let supply be $S(p+g) = d(1+g)p$, where g represents a government subsidy to producers. (I.e. the total amount the government pays out is $gpX(p)$.)
- (a) What is the equilibrium price and quantity?
 - (b) What is the government payout in equilibrium?
 - (c) Using derivatives, show the change in the equilibrium government payout for a change in g . Show that it is always positive for all $\epsilon < 0$ and $g > 0$.