

Problem Set #3

Due Wednesday 3/23/11 by 6 p.m. in the Econ 110-1 slot in the Economics Alcove

Use a stapler! Write legibly and use full and grammatically correct sentences in your answers. Draw graphs neatly and label axes and points clearly. Show your work on calculations. Each part below is weighted equally in grading, as are subparts within a part.

A. Firms facing downward-sloping demand curves:

Elkind Ltd., a monopolist with costs $C(Q) = \frac{1}{2}Q^2 - 100Q + 140,000$,
faces the market demand curve $Q = 5000 - 10P$.

- 1) a. What is the inverse demand curve? What is the marginal revenue curve?
b. Sketch the inverse demand, MR, MC, and AC curves on the same graph.
c. Solve for Elkind's optimal quantity and price and show this point on your graph.
d. How much are Elkind's profits? Show the area representing profit on your graph.
- 2) a. What would the quantity and price be for this firm if it were forced to price at marginal cost (i.e., act as if it were in perfect competition)? Show this point on your graph.
b. Calculate the deadweight loss caused by this monopoly and show this area on your graph. How much consumer surplus is transferred to the monopolist (as compared to the perfectly competitive case)?
- 3) a. Now assume the government imposes a tax $t = 30$ on each unit sold in this market (assume the firm is again acting as monopolist). Calculate the new quantity and price.
b. How much tax revenue is collected in the short run? How much after-tax profit does the monopolist make in the short run? What happens in the long run in this market?

There are 20 firms in the market for wodgets.

Each firm faces its own demand curve: $q = 150 - 5P$.

Each firm has the cost function $C(q) = 6q + 120$.

- 4) a. What quantity does each firm supply? What price does each firm charge?
b. What are profits for each firm? Are costs minimized?
c. Is this a long-run market equilibrium? If not, describe (qualitatively) what will happen in the market.
d. Is monopolistic competition less efficient than perfect competition? Explain carefully.

B. Factor markets:

Consider the firm's short-run production function $Q = 10\sqrt{L}$
where Q = the firm's output, and the only variable input in the short run is labor L

- 1)
 - a. What is the marginal product of labor MP_L ?
 - b. Assume the firm is a price-taker in the output market, with price $P = 5$. What is the firm's marginal revenue product of labor MRP_L ?
 - c. Assume the firm is a price-taker in the labor market, with wage $w = 1$. How much labor does the firm purchase? How much output does it produce?
 - d. Sketch the firm's MRP_L curve and a line indicating w and show the firm's optimal point on your graph.
- 2) Now assume the firm is a monopolist in the output market, facing the (inverse) demand curve $P = 30 - \frac{1}{10}Q$.
 - a. What is the firm's MR curve?
 - b. Now what is the firm's MRP_L ?
 - c. Assume the firm is a price-taker in the labor market, with wage $w = 1$. How much labor does the firm purchase? How much output does it produce?
 - d. How much more profit does the firm make as compared to **1)**?
- 3) Now assume the firm is a price-taker in the output market, but a monopsonist in the labor market, facing the (inverse) labor supply curve $w = \frac{L}{250}$.
 - a. Write down the firm's profit function (assume no fixed costs).
 - b. Solve for the optimal quantity of labor. How does this compare to the amount in **1)c)**?
 - c. What does the firm set w to be?
 - d. Sketch a diagram illustrating the monopsonist's optimal point in the labor market.
- 4) Draw labor market diagrams to illustrate your analyses as well as using words.
 - a. Explain why a binding minimum wage is always inefficient if the labor market is perfectly competitive.
 - b. Explain how a binding minimum wage can actually increase efficiency if the labor market is monopsonistic.

C. Aggregate supply and demand shifts:

Indicate whether each of the following events is the cause or the consequence of a shift in US aggregate demand and/or supply. If it is a cause, illustrate the situation before and after the event and predict the effect on the price level and on real national income. If it is a consequence, discuss what could have caused the event and illustrate the situation using the AS-AD framework.

- 1) Inflation decreased and unemployment increased in 2009.
- 2) Hurricane Katrina reaches land along the Gulf of Mexico in 2005.
- 3) The Iraq War disrupts oil shipments in 2003.
- 4) Both inflation and unemployment decreased from 1992-95.
- 5) President Reagan achieves a large increase in defense spending in 1983-84.
- 6) OPEC is forced to accept lower oil prices in 1982-83.
- 7) OPEC raises oil prices in 1979.
- 8) In the late 1960s and early 1970s, the United States suffers a rapid inflation under conditions of approximately full employment.

D. Measurement and interpretation of macroeconomic variables:

Consider the data on real GDP and the price level in the following table:

<u>Year</u>	<u>Real GDP (Billions of \$, 1987 prices)</u>	<u>Price level (GDP deflator, 1987 = 100)</u>
1980	3776	71.7
1981	3843	78.9
1982	3760	83.8
1983	3907	87.2
1984	4149	91.0
1985	4280	94.4
1986	4405	96.9
1987	4540	100.0
1988	4719	103.9
1989	4838	108.5
1990	4897	113.3
1991	4861	117.7
1992	4986	121.1
1993	5133	124.2

- 1) For the years 1981 to 1993, calculate the rate of growth of real GDP and the rate of inflation. In which years were there recessions? Which year had the worst recession during this period?
- 2) In an AS-AD diagram, sketch a set of AS and AD curves that would trace out the price and output equilibria shown in the table for the years 1988 through 1993. Try to draw as few as possible to explain the outcomes. How would you explain the recession that occurred during this period (in terms of relative AS and AD shifts)?

Consider these three years of data on nominal and real GDP:

<u>Year</u>	<u>Nominal GDP (Billions of \$, current prices)</u>	<u>Real GDP (Billions of \$, 2005 prices)</u>
2009	14,119	12,881
2006	13,399	12,976
2005	12,638	12,638

- 3) What is the GDP deflator for 2006? What is the GDP deflator for 2009?
- 4) What is the nominal GDP growth rate from 2005 to 2006? How much of it is growth in real output, and how much of it is rising prices?