1. **Growing.** Along with the fracking boom has led to an increased demand for drilling supply equipment. Suppose Stewart Manufacturing Co. (perhaps owned by a distant cousin of Wesleyan physics professor Brian Stewart) is one of many perfectly competitive firms in the drilling supply industry. It has a production function that uses labor and steel and an upward-sloping marginal cost curve. Both labor and steel are variable factors in the short run.

   (a) Market demand for drilling supply equipment rises. Draw a graph of the overall equipment market and separately draw a graph of Stewart’s firm-level demand and cost curves. Show how, in the short run, the increase in market demand affects prices and quantities on both graphs.

   (b) Though market demand for oil equipment rose, Stewart buys labor and steel in much larger markets where wages and the price of steel remain unchanged. Draw a graph showing Stewart’s isoquants and isocost lines. Show the situation before and after the increase in market demand (again in the short run, but remember both factors are variable).

2. **Coke.** Suppose that all around the world, there are small towns in which the price elasticity of demand for Coca-cola is constant at -1.2. Each of these towns is served by a monopoly Coke distributor. However, the technology for distributing Coke varies widely: huge bottling plants and 18-wheeler truck delivery in the USA, local bottlers and van delivery in Japan, delivery by pack mule to isolated parts of Bolivia, etc.
(a) What is the Lerner Index on Coke in these markets?

(b) Let the production function be \( f(K) = \beta K^2 \), where \( \beta \) varies from place to place, and let the price of capital be 20. How does the price of Coke vary with \( \beta \)? (This is pretty tricky. Note that there is a constant elasticity demand, check review problem Minus2.)

Review problem only, not to turn in:

3. Minus2. Suppose the demand curve for a good is:

\[
x(p) = 1000p^{-2}
\]

There is a monopoly which produces this good, and it has constant marginal cost of $2 per unit.

(a) What is the monopoly optimal price, quantity, and profit?

(b) What is the deadweight loss of this monopoly?

Answers to Review Problem:


(a) This is easy because we have a constant elasticity demand curve with \( \epsilon = -2 \) and a constant marginal cost of $2. Thus, the Lerner Index form of the monopoly’s first order condition tells us that

\[
\frac{p - 2}{p} = -\frac{1}{-2} \Rightarrow p^* = 4
\]

The demand curve tells us that \( x(4) = 1000 \times 4^{-2} = 62.5 \). The constant MC is the same as the AC, so there is a profit of $2 per unit, or a total profit of 125.
(b) At \( p^* = MC = 2 \), the monopoly quantity is

\[ x(2) = 1000 \times 2^{-2} = 250 \]

The deadweight loss is the area between the price of 2 and 4, but not including the monopoly profit:

\[
\int_2^4 1000 p^{-2} dp - 125 = -1000 \times 4^{-1} + 1000 \times 2^{-1} - 125 = $125
\]

This is represented by areas A and B in the following figure: