Microeconomics, Module 9: "Welfare Economics and the Gains from Trade" (Chapter 8)

Homework

(The attached PDF file has better formatting.)

CANAAN WINERY

The market for wine has many competitive producers and two types of consumers: residents of Canaan, whose demand curve for flasks of wine is $Q_J = 10 - P$, and residents of Aram, whose demand curve for flasks of wine is $Q_R = 20 - 4P$. Quantity is in thousands of flasks of wine; Price is in shekels.

In this exercise, the wineries are *not* able to charge separate prices for residents of Canaan and Aram, since the market is competitive and no producer has market power.

Wine can be grown only in fertile vineyards, so its marginal cost curve increases steeply. The marginal cost for wine is MC = Q.

A. What is the total market demand curve for flasks of wine? (For any price P, add the quantities demanded in Canaan and Aram.)
B. What is the equilibrium price for flasks of wine? (Use the intersection of the supply curve and the market demand curve.)
C. What is the equilibrium quantity for flasks of wine? (Given the quantity, read the price off the demand curve or the supply curve, or solve for the equilibrium quantity from the supply and demand curves.)
D. How much wine is sold in Canaan? (Given the price of a flask of wine, use the demand curve for Canaan to determine the quantity sold.)
E. How much wine is sold in Aram? (Given the price of a flask of wine, use the demand curve for Aram to determine the quantity sold.)
F. What is consumers' surplus in Canaan? (This is the area of a triangle: the *base* is the market price, the left side is the vertical axis, and the top is the demand curve for residents of *Canaan*. The length of the base is the quantity sold in Canaan.)
G. What is consumers' surplus in Aram? (The base is the market price, the left side is the vertical axis, and the top is the demand curve for residents of *Aram*. The length of the base is the quantity sold in Aram.)
H. What is the producers' surplus? (This is the area of a triangle: the *top* is the market price, the left side is the vertical axis, and the bottom is the marginal cost curve for producers. The length of the top is the quantity sold in Canaan plus Aram.)

The Canaan winery is inefficient. Joseph buys the winery and introduces cost-efficient wine-making, changing the marginal cost curve to MC = Q/5. The market is competitive, so all wineries adopt the new production techniques, and the marginal cost curve defines the new market supply curve for both Aram and Canaan.

I. What is the new equilibrium price for flasks of wine?
J. What is the new equilibrium quantity for flasks of wine?
K. How much wine is sold in Canaan?
L. How much wine is sold in Aram?
M. What is consumers' surplus in Canaan?
N. What is consumers' surplus in Aram?
O. What is the producers' surplus?

This homework assignment shows how the cost of production affects both producers' surplus and consumers' surplus in a competitive market.

We determine the total demand as the demand in Canaan plus the demand in Aram:

$$10 - P + 20 - 4P = 30 - 5P.$$

We determine the equilibrium price and quantity from P = 30 – 5P. The equilibrium price is so high that residents of Aram don't buy any wine, so their consumers' surplus is zero.

With the new production technique, everyone buys wine, and consumers' surplus increases in both Canaan and Aram. The arithmetic for all the pieces is easy.