14.03: Fall 2000
Suggested Solutions to Study Questions on the United States Sugar Program

a. $Q(P) = KP^{-a}, a = 0.3$ (since this is a constant-elasticity demand function)

   $29 = K(22)^{-0.3} \Rightarrow K = 29(22)^{0.3} \approx 73.3$

   The demand function is $Q(P) = 73.3P^{-0.3}$.

b. Total demand at the world price is $Q(6.8) = 73.3(6.8)^{-0.3}$, or about 41.24 billion pounds per year.

c. U.S. sugar supply and demand:
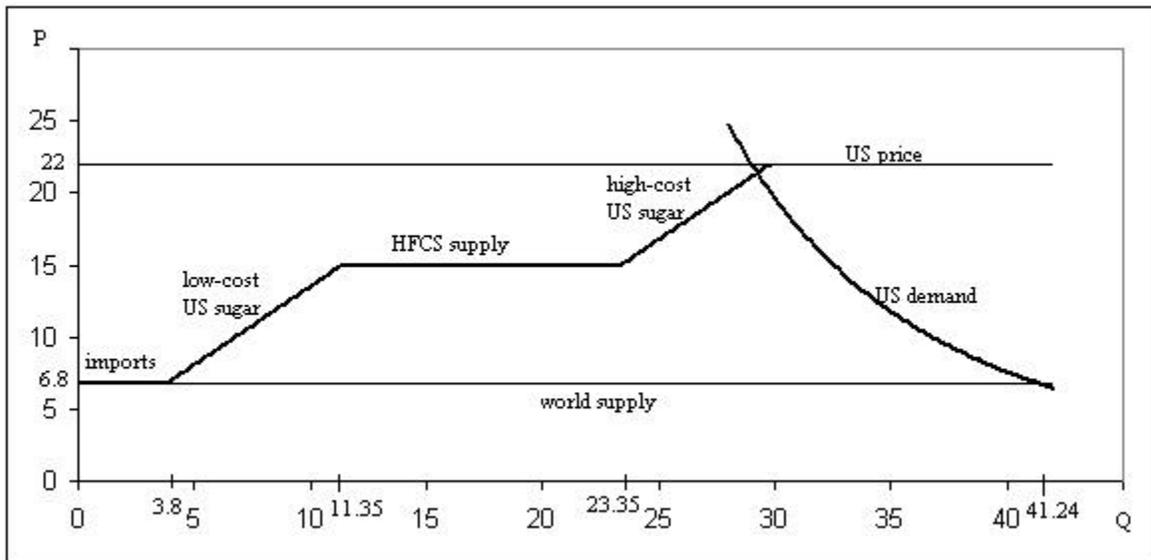
d. Excess cost to HFCS consumers is (12 bn/yr)($0.22 - $0.068) = $1.824 bn/yr. The part due to the excess cost of production is $0.984 bn/yr, and the part due to the price support (which is surplus for HFCS producers) is $0.84 bn/yr.

e. Domestic sugar producers supply 13.2 bn pounds at a cost ranging from $0.068 per pound to $0.2113 per pound. Since the price is $0.22 per pound, the surplus that domestic sugar producers get from the program is equal to (13.2)(0.22-0.2113) + ½(13.2)(0.2113 – 0.068) = $1.06 bn/yr.

f. Foreign producers supply 3.8 bn pounds at a cost of $0.068 per pound. The surplus the foreign producers get is (3.8)(0.22-0.068) = $0.5776 bn/yr.

g. The total amount of transfers to producers is the sum of the producer surpluses from the previous three parts: $2.4776 bn/yr.

h. In the absence of the program, the price would fall to 6.8 cents per pound. Hence the loss in consumer surplus due to the program is

$$\int_{P=6.8}^{P=22} Q(P)dP = 73.3\int_{P=6.8}^{P=22} P^{-0.3} dP = 73.3(P^{0.7}/0.7)]_{P=6.8}^{P=22} = \$5.1 \text{ bn/yr.}$$

i. The loss in consumer surplus is $5.1 bn/yr, while the gain in domestic producer surplus is only $1.9 bn/yr. This is not an efficient public policy.

j. The size of the North Dakota industry is irrelevant to an evaluation of the cost and benefits of the program.

   As long as there are alternative uses for the land currently used for sugarbeets, the economic loss is not ¼ million times $300. To calculate the loss, you would need an estimate of the value of sugarbeet land if it were used for its next-most valuable use.

   For the same reason, multiplying the number of farming jobs times the earnings of farmers is not a reasonable estimate of the economic cost of the job loss that would occur if the program ended. A reasonable estimate might be:
   (Number of sugar jobs)(average sugar wage – average wage for non-sugar farm jobs).