PROBLEM SET ONE -- ECON 3010

- <u>1</u>. Start with the following supply & demand schedules: P = 200 2Q & P = 20 + 4Q.
- a) Find the market-clearing (equilibrium) P & Q and the $E_P^{demand} \& E_P^{supply}$ at the equilibrium P & Q.
- b) If there is a \$30 tax on sellers, find the equilibrium P & Q.
- c) With no tax on sellers, but a \$30 tax on buyers, find the equilibrium P & Q.
- $\underline{2}$. a) Using Figure 1, what are CS & PS when the market clears?
 - b) If there is a price ceiling of P_0 , what are CS, PS, & DWL?
 - c) If queues occur, what is different?
- <u>3</u>. a) Using Figure 2, what are CS & PS when D = D₁?
 b) Explain what CS & PS are with D₂, & what was responsible for the changes compared to D₁.
- <u>4</u>. a) Using Figure 3, what are CS & PS with no tax?
 b) Suppose a tax of \$Z per unit is imposed on sellers. What, are P, Q, CS, PS, DWL, & tax revenue?













Answers

<u>1</u>. a) Set demand & supply (D & S) equal, find Q, & then insert Q into either D or S to find P:

$$200 - 2Q = 20 + 4Q, \implies Q = 30 \& P = $140$$

$$E_P = \frac{1}{slope} \frac{P}{Q}$$
, so $E_P^{demand} = -\frac{1}{2} \frac{140}{30} \approx -2.33$, & $E_P^{sup \ ply} = \frac{1}{4} \frac{140}{30} \approx 1.17$.

- b) A \$30 tax on sellers \Rightarrow S is now P = 50 + 4Q---each seller now sells the same Q only if P is \$30 higher. Now solving D & S yields Q = 25 & P = \$150. $\Delta P = $10---1/3$ of the tax. Each seller gets to keep \$120---\$20 less than before, so sellers bear 2/3 of the burden of the tax. Sellers bear a larger tax burden because they are less responsive to P than are buyers: $|E_P^{demand}| > E_P^{supply}$.
- c) With a \$30 tax on buyers, each buyer is willing to pay \$30 less, so D is: P = 170 2Q; solving D & S yields Q = 25 & P = \$120. Buyers again end up paying \$10 more, & sellers keep \$20 less per unit compared to the case with no tax.
- <u>2</u>. a) At market clearing, CS = u + v + y, & PS = w + x + z.
 b) With a price ceiling = P₀, CS = u + v + w, PS = x. DWL = y + z.
 c) With queues, the time costs of buying the good increase, which is like a tax on buyers. Demand decreases, lowering CS by the amount of the time costs---an additional DWL.
- <u>3</u>. a) When demand is D₁, CS = b + d, & PS = g.
 b) When demand is D₂, CS = a + b + c, & PS = d + e + f + g.

Consumers gain a + e on the Q_1 units they would have purchased without demand increasing because they value the good more, & gain c because Q^{\uparrow} .

They lose d + e because P^{\uparrow} . Ignoring e (which is gained & lost by consumers), consumers gain a + c & lose d---they could be better or worse off.

Producers gain d + e + f---they clearly are better off. Note: d is transferred from consumers to producers---it is not lost to society. Producers gain d + e on the Q_1 units they would have produced without demand increasing because $P\uparrow$, & gain f because $Q\uparrow$.

CS + PS increases by a + c + e + f----society clearly gains.

 $\underline{4}$. With no tax, CS = a + b + c, & PS = d + e + f.

With a tax of \$Z per unit imposed on sellers, supply decreases & intersects demand at $P_0 + z$, Q_2 . Now CS = a & PS = f. Although producers receive total revenue of $[P_0 + z][Q_2]$, they must give the government $[Z][Q_2] = b + d$ ---the tax revenue. DWL = c + e.