Microeconomics for Public Policy I
Fall 2017

Problem Set 11
Due Lecture 13 in class on paper

1. GLS Chapter 17, Question 2

The problem gives us the following information: $MC = (1/4)Q$, $MR = 6$, and $MEC = 1/2$.

(a) Jill (and any producer) maximizes profit where $MR = MC$.

Here,

$$\begin{aligned} MR &= MC \\ P &= (1/4)Q \\ 6 &= (1/4)Q \\ Q &= 24 \end{aligned}$$

(b) The cost of the last bouquet to Jill is $MC = (1/4)Q = (1/4)24 = 6$ (Note that this is equal to the price!).

The cost the last bouquet imposes on Cooper is $MEC = 1/2$.

Producing the last bouquet is not a good thing for society, since it costs more to society ($6 + $0.50) than its value to society ($6).

(c) From society's standpoint, Jill is overproducing bouquets, since the benefits are exceeding the costs.

(d) If Jill internalizes the costs to Cooper, her new cost function will be $MC = (1/4)Q + 1/2$.

(e) If Jill fully internalizes the costs to her husband, she will produce where marginal revenue equates to social marginal cost.

$$\begin{aligned} MR &= SMC \\ P &= (1/4)Q + 1/2 \\ 6 &= (1/4)Q + 1/2 \\ 5.5 &= (1/4)Q \\ Q &= 5.5 * 4 \\ Q &= 22 \end{aligned}$$

2. Rosen and Gayer Chapter 4, Question 11 (page 70)

(a) We would not expect to find the efficient number of lighthouses because lighthouses are public goods. Due to the free rider problem, we expect under-provision relative to the optimal level.

(b) The optimal or efficient level would be where the market demand equates to market supply.

In the case of Zach and Jacob, we need to find their total demand. See the picture at the end – which I always encourage you to draw for clarity.

Remember that for public goods, we add up the prices people are willing to pay, so that the total willingness to pay (P_T) is the sum of Zach's willingness to pay (P_Z) and Jacob's willingness to pay (P_J). In other words,

$$P_T = P_Z + P_J = 90 - Q + 40 - Q = 130 - 2Q$$

However, note that this formula applies only for quantities less than 40. Above 40, Jacob does not want any light houses, so the demand is only Zach's. In math, in total

$$P_T = \begin{cases} 130 - 2Q & \text{if } 0 < Q \leq 40 \\ 90 - Q & \text{if } Q > 40 \end{cases}$$

To find the optimal level, we need to equate the marginal cost of a lighthouse (\$100) with the marginal benefit, which is the demand curve we calculated.

If we plug $MC = MB$ into the first half of the market demand curve, we find

$$\begin{aligned} 100 &= 130 - 2Q \\ 2Q &= 30 \\ Q &= 15 \end{aligned}$$

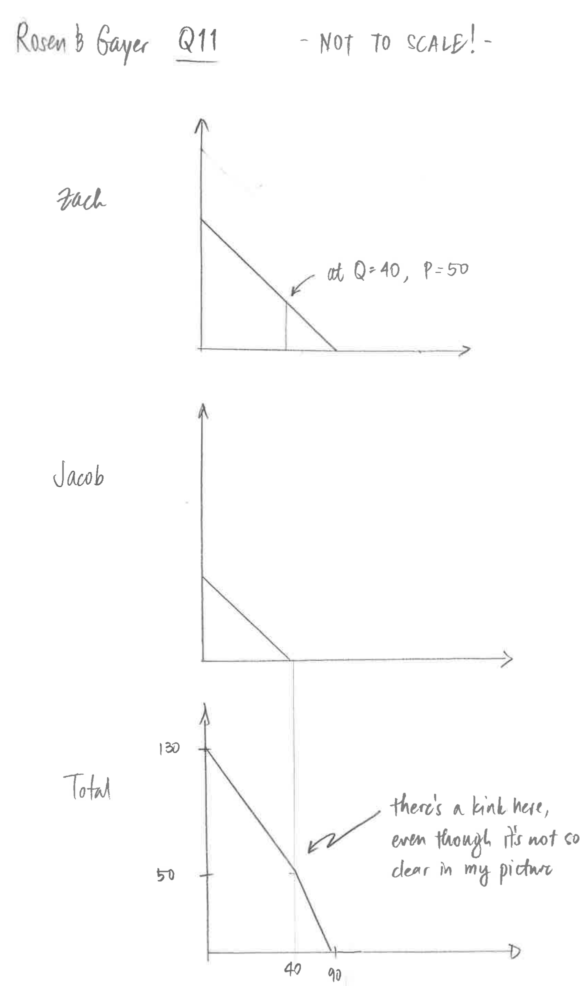
Note that this fits in the restriction for Q in the equation (and also look at the picture to see that this is likely the right part of the demand curve).

If we plug $MC = MB$ into the second half of the market demand curve, we find

$$\begin{aligned} 100 &= 90 - Q \\ Q &= -10 \end{aligned}$$

Negative quantities are always a sign that something is wrong! This is not the right part of the demand curve. Again, look at the picture if this doesn't make sense.

To find the net benefits from the lighthouse, we need consumer surplus, which is the triangle above price and below the demand curve. Here, the height of the triangle is $= 130 - 100 = 30$. The width of the triangle is 15, or the optimal quantity. Thus, total consumer surplus is $= \frac{1}{2}(15)(30) = 225$.



3. Public Goods

Give an example of a good that has some public good aspects. Please give an example that we have not covered in class and is not in the textbook. Explain what elements of this good are public (in the sense of being a public good) and which are private.

A well-reasoned answer uses the definition of public goods.