

## 1 Problems

1. TV Island
2. Friends Apartment
3. Concert

## 1.1 TV Island

There are 2,000 television set owners in a town. A television network broadcasts over the airwaves and its signal cannot be interfered with; everyone who owns a television set is able to view the network's broadcasts. The network has to decide whether to produce a new reality show. Each reality show episode is valued at \$20 by each television set owner. That is, each tv set owner would be willing to pay at most \$20 to view each episode of the show. Producing each episode costs \$10,000. At most 30 episodes can be produced.

a) Is consumption of the new show *rival*? Explain.

b) Is consumption of the new show *excludable*? Explain.

c) How many episodes would a utilitarian social planner want to produce? Justify your answer.

d) Suppose now that pay-per-view, a new technological breakthrough, is introduced. This allows the network to direct its signal only to those television owners who pay to watch an episode. How much will the (monopolistic) channel charge per episode, and how many episodes will be produced?

**Answer Key:**

a,b) The consumption of the new show is not rival and not excludable.

c) The number of episodes a utilitarian social planner wants to produce is 30.

d) It will charge \$20 per episode and still produce 30 episodes.

## 1.2 Friends Apartment

Monica and Rachel share an apartment. They are considering buying pictures to hang on the wall to make the living room look more elegant. The two persons have identical utility function  $U(G, X) = u(G) - X$ . Here,  $u(G)$  is the utility from pictures where  $G$  is the number of pictures and  $X$  is the amount paid for the pictures by each person. It is given that  $u(1) = 4$ ,  $u(2) = 6$ , and  $u(3) = 7$ . One picture costs 3.5 dollars.

a) What is the 'socially' optimal level of  $G$ ?

b) Suppose Monica has to buy pictures with her money and Rachael does not make any contribution. How many pictures would Monica buy? Is the outcome efficient?

c) Phoebe, their friend, stops by and suggests a way to attain the socially optimal level of  $G$  obtained in a). If she has the Rawlsian view, what would be her suggestion of the split of the cost? Will this be accepted by Monica and Rachael? What if Phoebe is a utilitarian?

**Answer:**

a) The individual marginal utility from the pictures is  $mu(1) = 4$ ,  $mu(2) = 2$ , and  $mu(3) = 1$ . Since there are two persons, the social marginal utility is  $smu(1) = 8$ ,  $smu(2) = 4$ , and  $smu(3) = 2$ . Since a picture costs 3.5, it is socially optimal to buy 2 pictures.

b) She will continue to buy as long as the individual marginal utility is larger than the price of a picture. Since  $mu(1) = 4$  and  $mu(2) = 2$ , she will buy only 1 picture.

c) It costs 7 dollars to provide the socially optimal level of pictures. If Phoebe has a Rawlsian view, she will try to maximize the utility of the worst-off person. Hence, she will suggest an equal split of the cost:  $X_M = X_R = 3.5$ . Since 3.5 is smaller than  $u(2) = 6$ , this will be accepted. If Phoebe has a utilitarian view, she will suggest any  $(X_M, X_R)$  that satisfies  $X_M + X_R = 7$ . Only  $(X_M, X_R)$ 's that satisfy  $X_M \leq 6$ ,  $X_R \leq 6$  will be accepted.

### 1.3 Concert

The following table shows the dollar amount of the *marginal* benefit enjoyed by Jose, Luciano, and Placido, consumers of classical concerts.

	Number of Concerts			
	1	2	3	4
Consumers				
Jose	150	100	100	75
Luciano	125	100	25	25
Placido	100	50	50	25

Producing each concert requires hiring the famous conductor Recordo Mute, at a cost of \$220 per concert.

a) Write down an aggregate demand schedule for classical concerts. (Note: in this setup classical concerts are a pure public good).

b) Suppose these concerts are financed by charging an admission price, the same for every consumer. The price may vary depending on the concert. How much would a profit-maximizing opera house be able to charge for each concert, and how many concerts would be produced?

c) What is the efficient (welfare-maximizing) number of concerts that should be produced? At the efficient allocation, who attends each concert that is produced?

**Note:** As mentioned in class, the question should read that concerts are an *impure* public good, rather than a pure public good. Impure public goods are excludable, non-rival goods.

**Answer Key:**

a) The aggregate demand schedule  $D(n)$  describes the aggregate marginal willingness to pay for  $n$  concerts.

Number of Concerts $n$	1	2	3	4
$D(n)$	375	250	175	125

b) The opera house must raise at least \$220 per concert in order to afford Recordo Mute. To do so they should offer just one concert and charge \$100 for it, in which case all three consumers will attend. The company will raise a profit of \$80 (\$300 in revenue from ticket sales minus \$220 in costs). If the opera house raises the price above \$100, then at most the first two consumers will attend lowering the revenue (weakly) below \$250, while the costs remain unchanged. If the opera house lowers the price below \$100, then all the consumers attend, but total revenue will fall below \$300, so charging \$100 per ticket is optimal. Note that if the opera house offers more than one concert for different prices, then consumers will either just attend the cheapest one to maximize their consumer surplus, or the ticket prices would have to be so cheap that the opera house would make a profit below \$80. For example, if the opera house charged \$125 for the first concert and \$100 for the second concert, then Jose and Luciano would only attend the second concert and receive a consumer surplus of \$50 and \$25 respectively, as opposed to attending both concerts and receiving a consumer surplus of \$25 and \$0 respectively.

c) At the efficient allocation 2 concerts will be produced and all consumers will attend each concert. Note that concerts are non-rival goods, which means that the marginal cost of another person attending a concert is zero once it is offered, so it can never be efficient not to let a consumer attend if the concert is held. If everyone attends the first concert, then the (total) marginal benefit is \$375 (from summing the first column of marginal benefits in the above table), which is greater than \$220 (the marginal cost), so offering the first concert is efficient. If a second concert is offered and everyone attends, then the (total) marginal benefit is \$250 (from summing the second column of the table), which again is above \$220, so offering the second concert is efficient. Offering a third concert would give a (total) marginal benefit of \$175, which is below \$220. Thus it is not efficient to offer more than two concerts.