Philippe Thalmann

Exercises

WTP AND DEMAND

Demand derived from WTP

This table shows Paul's willingness to pay to spend a day in a natural park over the course of a month:

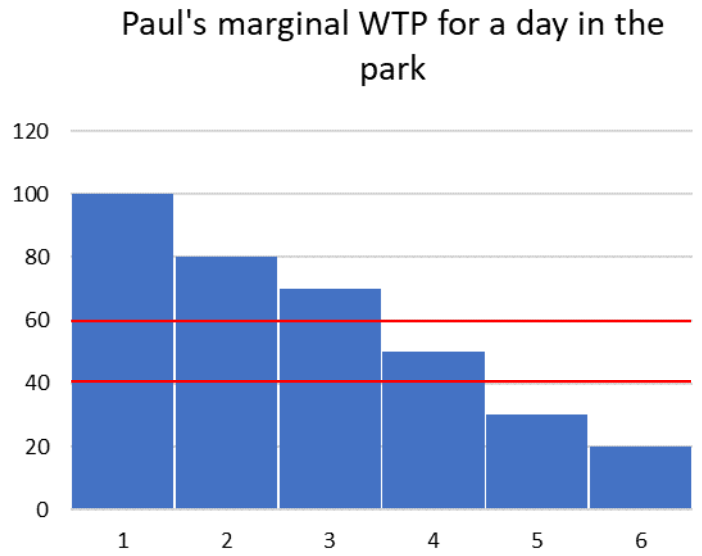
Visits per month	Total willingness to pay
1	100
2	180
3	250
4	300
5	330
6	350

1. Suppose that Paul is rational and the only cost of visiting the park is the entry ticket costing 60. How often will Paul visit the park?
2. Suppose that the entry ticket is lowered to 40. How many days will Paul spend in the park?
3. Suppose that Paul already enjoyed 3 free days in the park. For how many more days will he accept to pay 40?

Demand derived from WTP - answers

The table now also shows Paul's total surplus and his marginal willingness to pay to spend an additional day in a natural park:

Visits per month	Total willingness to pay	Total ticket price	Total surplus	Marginal willingness to pay	Ticket price
1	100	60	40	100	60
2	180	120	60	80	60
3	250	180	70	70	60
4	300	240	60	50	60
5	330	300	30	30	60
6	350	360	-10	20	60



1. For a ticket price of 60, Paul's total surplus is maximized with **3** visits; his marginal WTP for a fourth visit is smaller than the ticket price
2. The answer is **4**: his marginal WTP for a fifth visit is smaller than the ticket price of 40 (no need to recompute total surplus)
3. Two possible answers for this question, but it must be well argued:
   - If Paul's WTP decreases for budgetary reasons, then the fourth visit is like the first in terms of WTP, and Paul would pay 40 for another **4** visits
   - If Paul's WTP decreases for reasons of saturation or lack of time, then the fourth visit is equivalent to the fourth visit in the table, with a marginal WTP of 50 > 40; hence Paul would go for **1** more visit but not a fifth

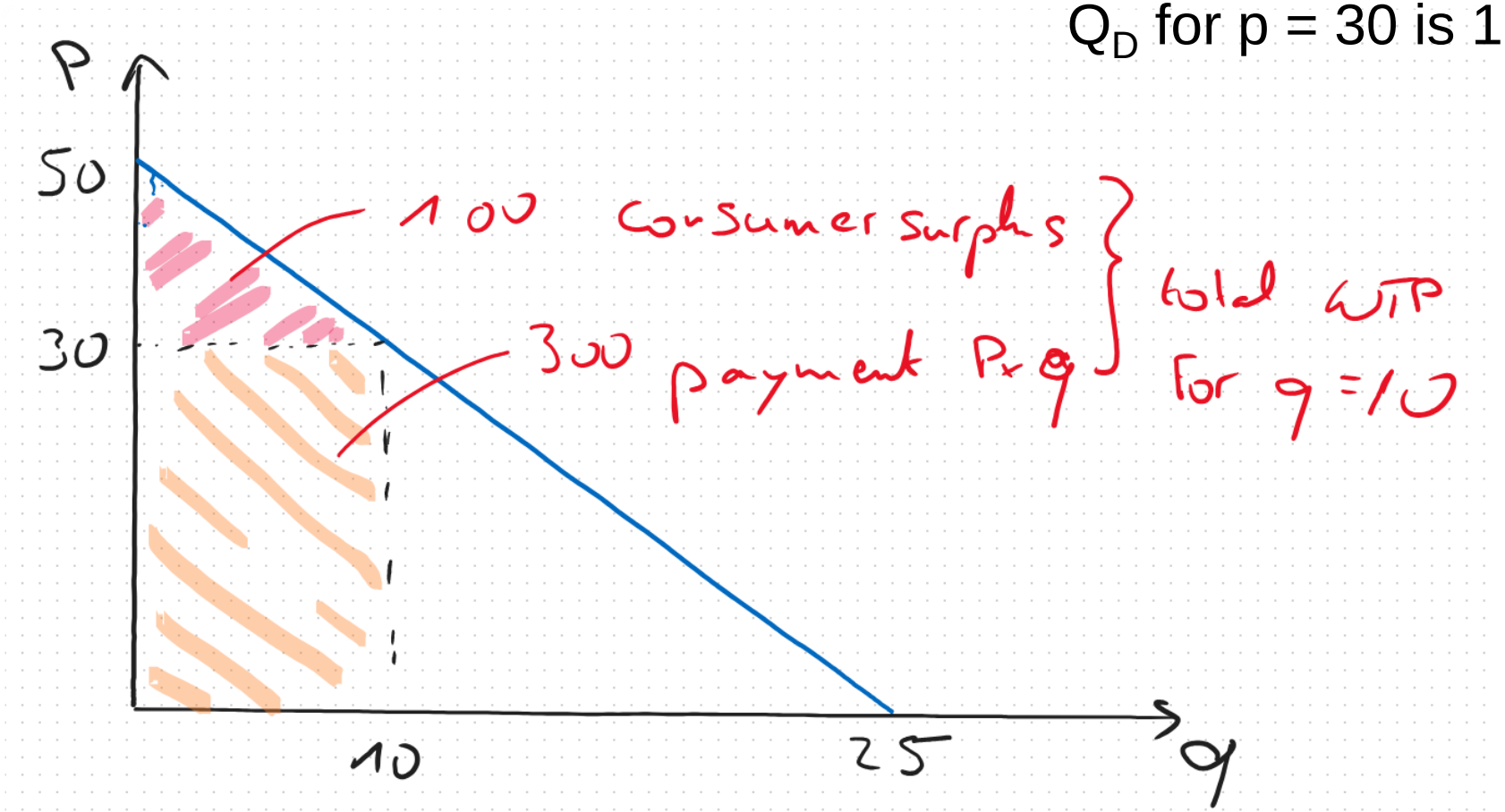
Demand ⇔ Marginal WTP

- Consider this demand function: $Q_D = 25 - p/2$
- What is the equation for the marginal WTP?
- How many units would be sold for a price p = 30?
- What is the total WTP for this number of units?
- What is the buyers' surplus for this number of units sold at price p = 30?

Demand ⇔ Marginal WTP answers

mWTP = 50 − 2q

Q_D for p = 30 is 10



Impact of price change on demand

Please complete this sentence:

When the price of a good increases, the demand of a single consumer for this good ….

It does so for two reasons:

1) …..

2) …..

Movements on and of the demand curve

Please show graphically the impacts on the demand curve for heating oil of the following events (*remember to name the axes of your graph)*:

a. The winter is particularly cold
b. Many buildings were given a stronger thermal insulation (and there is no offsetting rebound)
c. A carbon tax raises the price of heating oil
d. The prices of solar panels and heat pumps decrease

Elasticity of demand

France raised the tobacco tax by 18% of cigarette prices in October 2003 and by another 9% in January 2004

After these two raises, the number of cigarettes sold decreased by 25% compared to before the tax increases

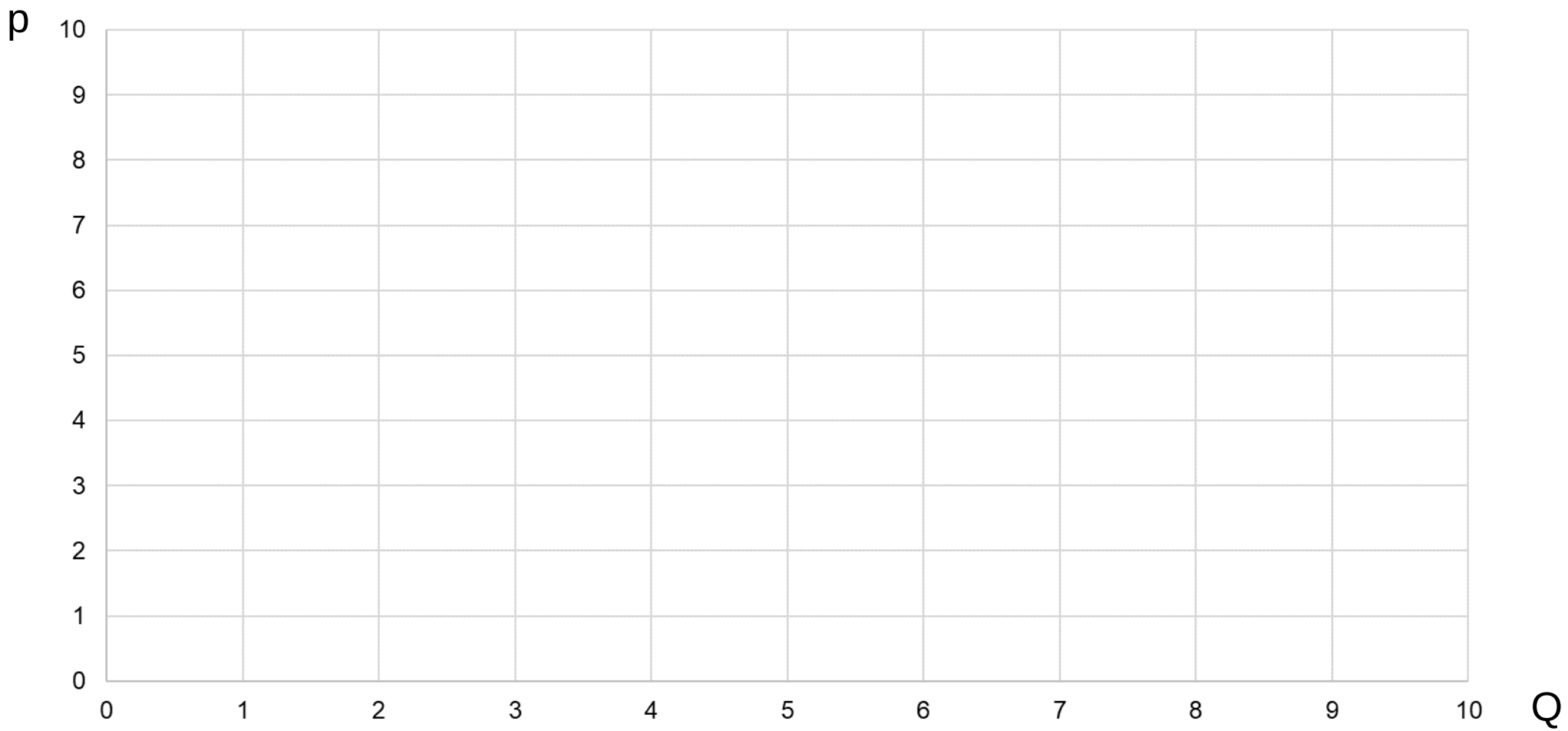
Please calculate the elasticity of cigarette demand

What assumptions do you have to make for this calculation?

From individual to aggregate demand

Demand of group A: $Q_A = 4 - p/2$ Demand of group B: $Q_B = 5 - p$

What is total demand?



From individual to aggregate demand

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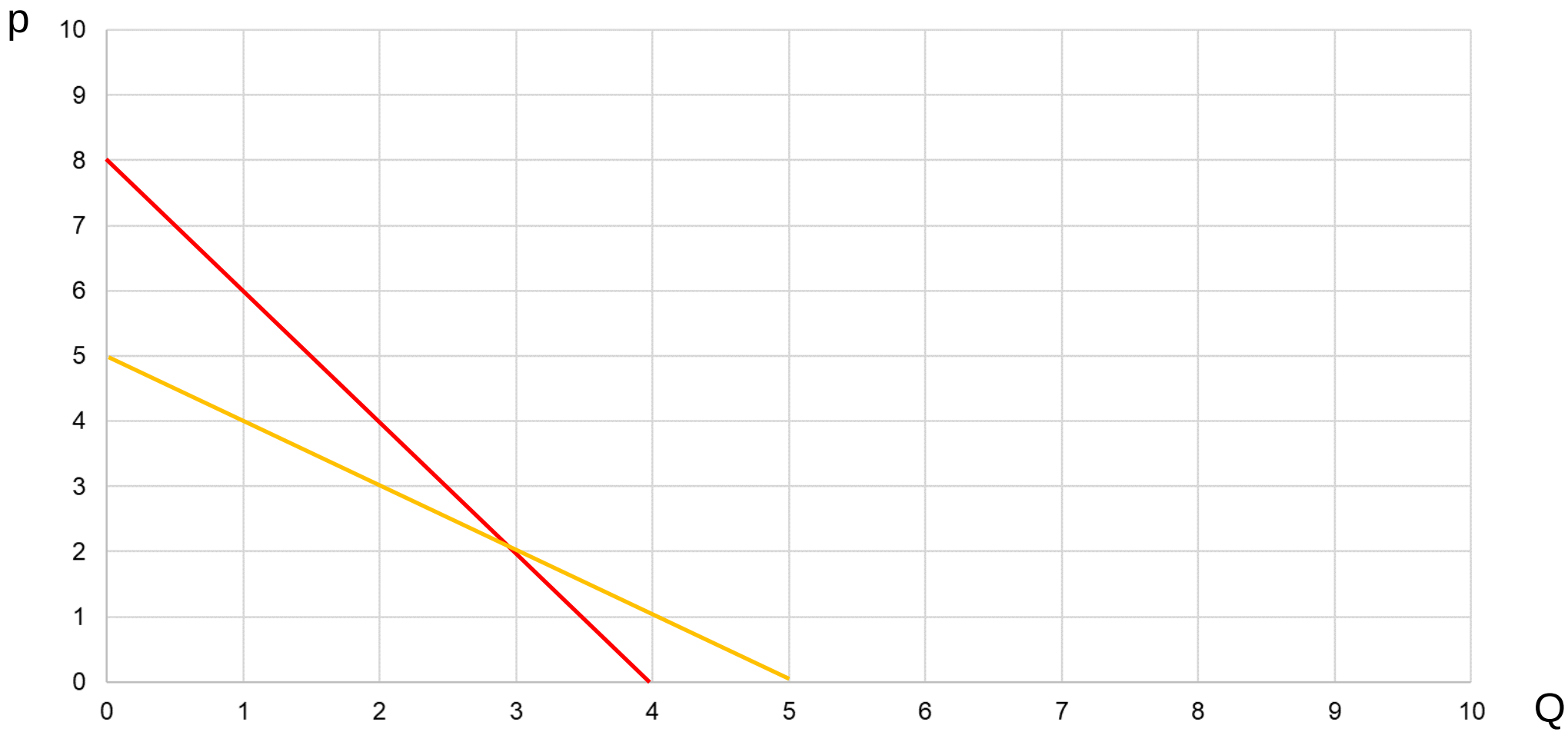


From individual to aggregate demand - answers

Demand of group A: $Q_A = 4 - p/2$ Demand of group B: $Q_B = 5 - p$

Total demand: $Q_{tot}(p) = Q_A(p)+Q_B(p) = 9 - 3p/2$ for $p \leq 5$

$Q_{tot}(p) = Q_A(p) = 4 - p/2$ for $5 \leq p \leq 8$

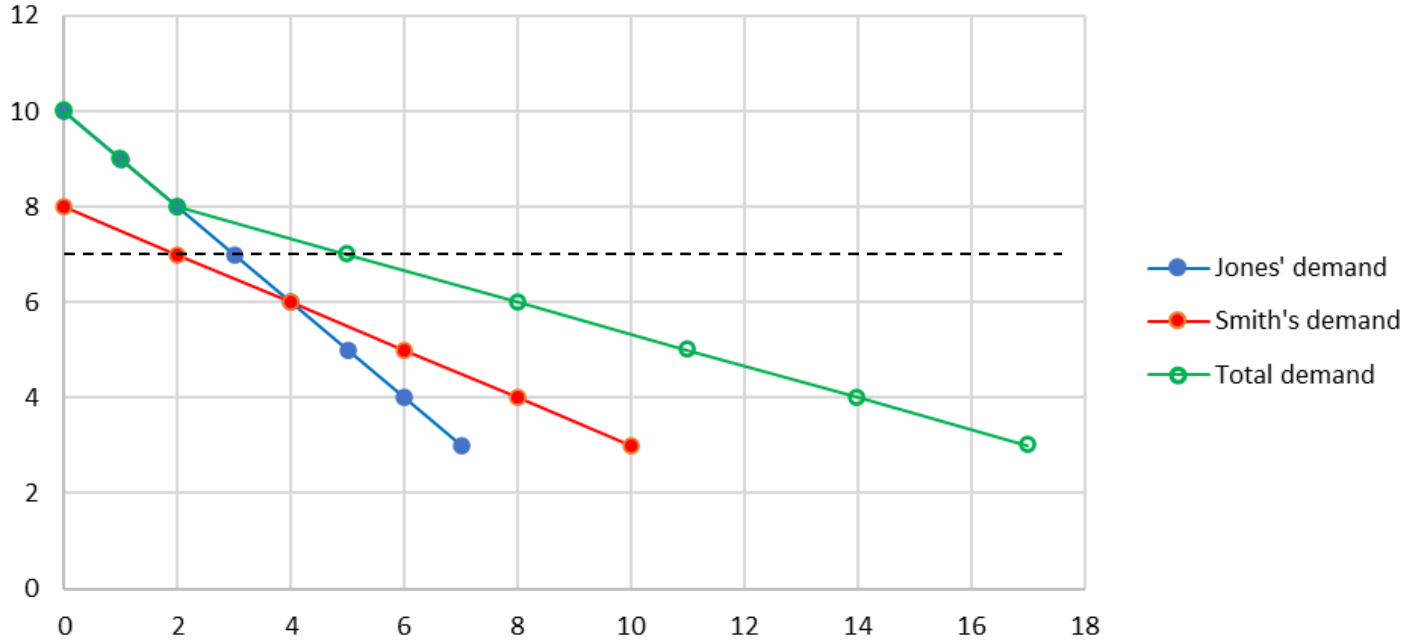
Aggregate demand and surpluses

The Jones and Smith families, living each in a single-family house, are interested in buying PV panels to put on their roof
The lower the price of panels, the more they intend to buy, as shown in the table

Price per panel	Jones	Smith	Total demand
10	0	0	
9	1	0	
8	2	0	
7	3	2	
6	4	4	
5	5	6	
4	6	8	
3	7	10	

a) Calculate the sum of the two demands and fill in the blanks
b) Draw the demands of the Jones, Smith and total
c) Calculate the Jones' and Smith's surplus if the price of a panel is 7
d) Estimate functions for Jones' and Smith's demand and total demand
e) Use the functions you estimated in d) to repeat question c)

Aggregate demand and surpluses - answers



c) For the 1st panel, J are prepared to pay at least 9 and at most a little less than 10, so their surplus is between 2 and 3; for the 2nd panel, they are prepared to pay between 8 and 9, so their surplus is between 1 and 2, and for the 3rd panel, they are prepared to pay between 7 and 8, so their surplus is between 0 and 1. J's surplus when p = 7 is therefore between 3 and 6.

It is possible that S are prepared to pay up to 7.99 for the first 2 panels, but it is also possible that their willingness to pay is just over 7 for each of these 2 panels; their surplus is therefore between 0 and 2.

d) Jones's demand: $Q = 10 - p$ for $p \leq 10$ and $Q = 0$ for $p > 10$. Smith's demand: $Q = 16 - 2p$ for $p \leq 8$ and $Q = 0$ for $p > 8$. Total demand is $Q = 26 - 3p$ for $p \leq 8$, $Q = 10 - p$ for $8 \leq p \leq 10$ and $Q = 0$ for $p > 10$.

e) The areas of the triangles between demand curve and price line are 4.5 for the Jones and 1 for the Smith, which is well within the limits calculated above.