7.

DEMAND

PROBLEMS:

- ❑ *needs and possibilities, potential demand and effective demand*
- ❑ *demand composition*
- ❑ *the law of demand*
- ❑ *main influence factors of demand*
- ❑ *elasticity of the demand*
- ❑ *elasticity regarding price*
- ❑ *elasticity regarding income*
- ❑ *crossed elasticity*
- ❑ *Giffen's paradox*
- ❑ *consumer surplus*

THEORETICAL ASPECTS:

The quantity demanded – the quantity from a merchandise that the buyers are willing and able to buy at a certain price and at certain moment from a market.

The elasticity of the demand – the way that the quantity demanded from a certain product reacts when a modification of a certain influence factor occurs. We are speaking about elasticity regarding: price, income, and price of other products (crossed elasticity).

Elasticity regarding price – the way that quantity demanded changes as a result of a price variation when all other influence factors are considered as constant (caeteris paribus). The same, elasticity regarding income shows the variation of the quantity demanded as a result of changes in consumers income, and crossed elasticity shows the variation when prices for other products are changing.
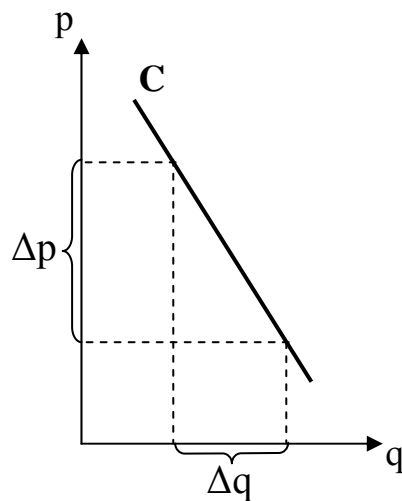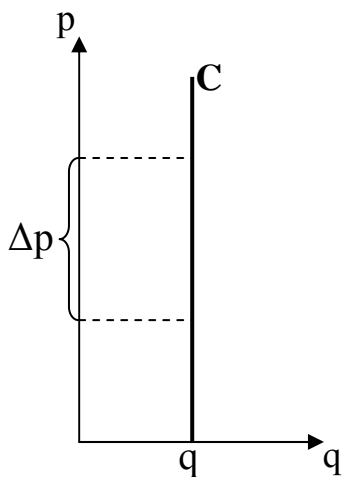
The consumer's surplus – the difference from how much a consumer was willing to pay for a certain quantity and how much he actually spends, paying at a lower market price.

Questions and stuff to discuss:

1. Coment on the graphs:
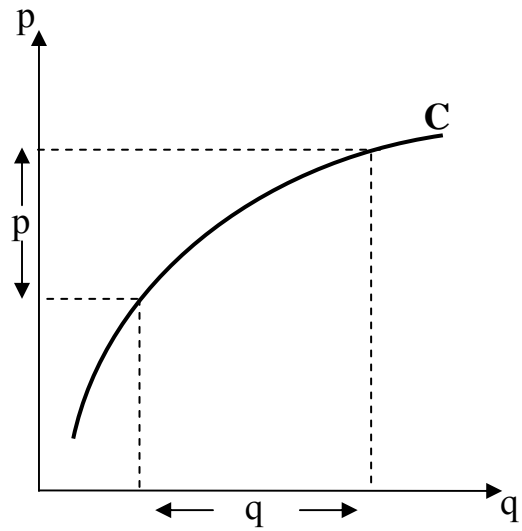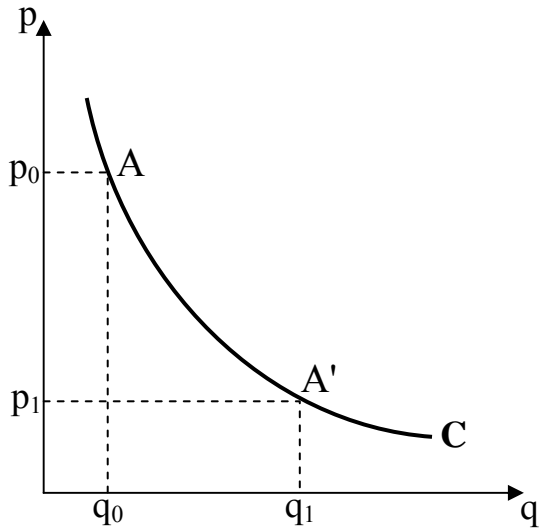
4. Identify the type of elasticity in the next graphs:
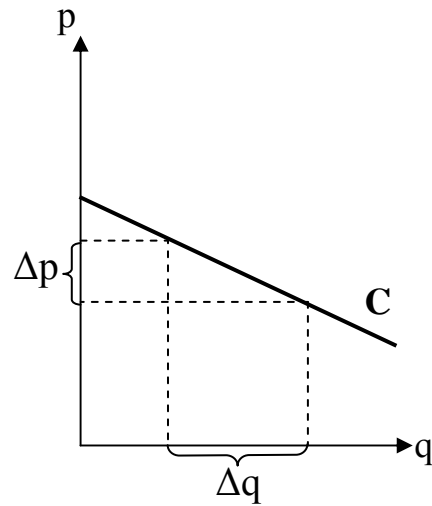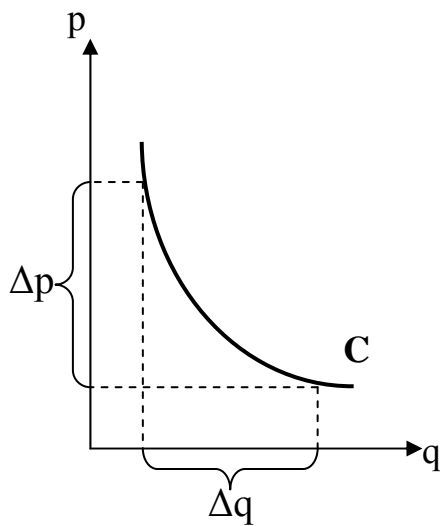
5. The elasticity – for one and the same product is not the same in all points for the demand curve

6. The change in demand due to different factors:

7. Explain how it is made the individual demand as correspondent of consumer's equilibrium:

Relations, examples and models:

1. Formulas:

$$\text{Elasticity of demand: } ec = \frac{\Delta Q\%}{\Delta F\%}$$
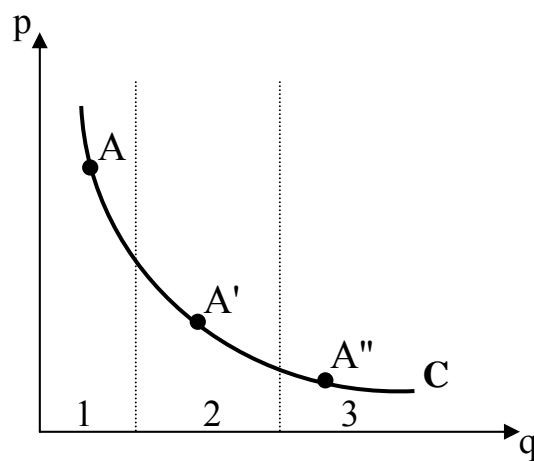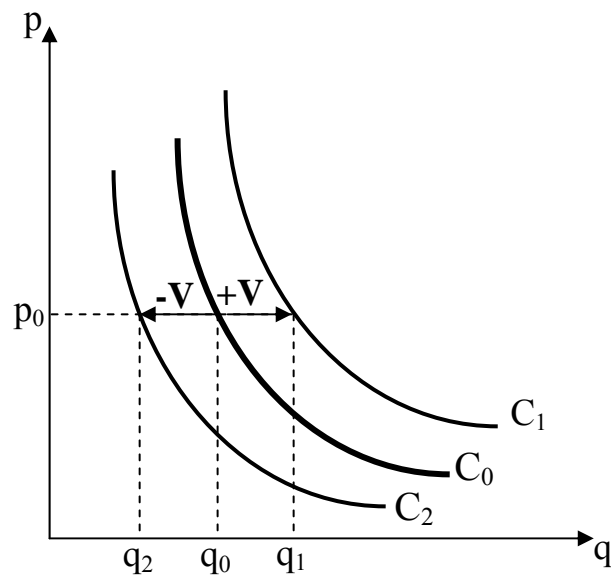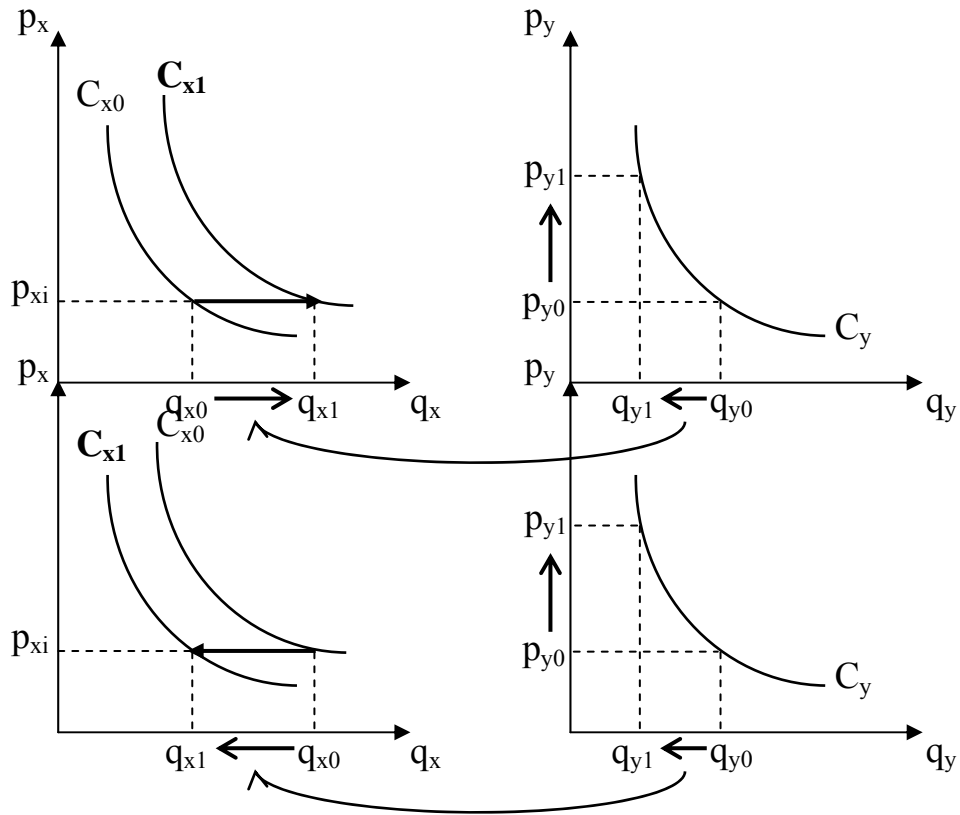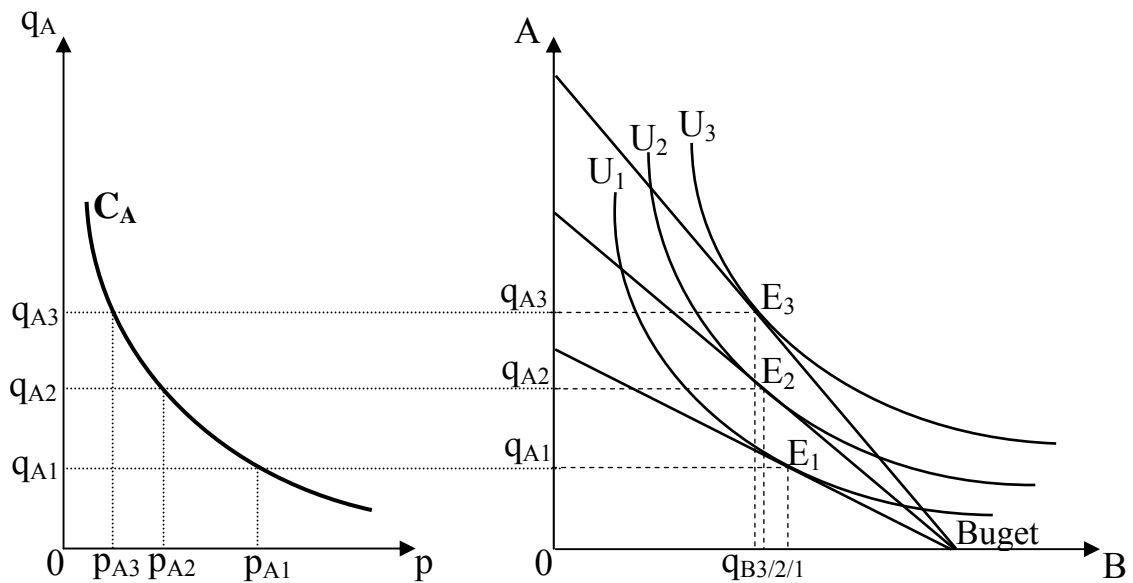
where: $\Delta Q\%$ = the percentage change of demand

$\Delta F\%$ = = the percentage change of a certain influence factor

The level of this coefficient shows how much the quantity demanded changed as a result of a percentage variation of an influencer factor all others considered as constant caeteris paribus).

$$\text{Elasticity of demand regarding price: } ecp = -\frac{\Delta Q\%}{\Delta P\%}$$

Where: $\Delta P\%$ = percentage change in price

$$\Delta Q\% = \frac{\Delta q}{q_0}, \ \Delta P\% = \frac{\Delta p}{p_0} \rightarrow ecp = -\frac{\Delta Q\%}{\Delta P\%} = -\frac{\dfrac{\Delta q}{q_0}}{\dfrac{\Delta p}{p_0}} = -\frac{\Delta q}{\Delta p} \cdot \frac{p_0}{q_0} \ \text{ or } \ ecp = -\frac{\partial q}{\partial p} \cdot \frac{p}{q}$$

The level of this coefficient is showing the change in demand at a percentage change of price.

$$\text{Elasticity of demand regarding income: } e_{cv} = \frac{\Delta Q\%}{\Delta Y\%}$$

$\Delta Y\%$ = percentage change of income

$$if \ \Delta Y\% = \frac{\Delta y}{y_0} \ \rightarrow \ e_{cv} = \frac{\Delta Q\%}{\Delta Y\%} = \frac{\dfrac{\Delta q}{q_0}}{\dfrac{\Delta y}{y_0}} = \frac{\Delta q}{\Delta y} \cdot \frac{y_0}{q_0} \ \text{ or } \ e_{cy} = \frac{\partial q}{\partial y} \cdot \frac{y}{q}$$

The level of this coefficient show how much the quantity demanded changed at a variation of 1% of consumer's income.

$$\text{Crossed elasticity: } ecxy = \frac{\Delta Qx\%}{\Delta Py\%}$$

Where : $\Delta P_y\%$ = percentage change of price of other product (y)

$$\Delta Qx\% = \frac{\Delta qx}{qx0} \ , \Delta Py\% = \frac{\Delta py}{py0} \ \rightarrow \ ecxy = \frac{\dfrac{\Delta qx}{qx0}}{\dfrac{\Delta py}{pyo}} = \frac{\Delta qx}{\Delta py} \cdot \frac{py0}{qx0} \ or \ ecv = \frac{\partial q_x}{\partial p_y} \cdot \frac{p_y}{q_x}$$

The level of this coefficient shows how much the quantity demanded changed as a result of price modification for other good "Y".

2. The main types of elasticity of demand in respect to price change:

Type of elasticity	*Coefficient*	*Relations*
Perfect Elasticity	$+\infty$	$\Delta Q\% \rightarrow +\infty$, $\Delta P\% \rightarrow 0$ dar $\Delta P\% \neq 0$
Elastic	$(1, +\infty)$	$\Delta Q\% > \Delta P\%$
Unitary Elastic	≈ 1	$\Delta Q\% \approx \Delta P\%$
Inelastic	$(0,1)$	$\Delta Q\% < \Delta P\%$
Perfect inelastic (rigid)	0	$\Delta Q\% = 0$ when $\Delta P\% \neq 0$, That means $\Delta q=0$, $\Delta p \neq 0$

3. The change of price will modify the total revenue for a company in close link with the elasticity type for the product that the company is selling – see the below table:

Demand type	*Price drops*	*Price increases*
Elastic	TR increases	TR decreases
Unitary Elastic	TR is almost constant	
Inelastic / Rigid	TR decreases	TR increases

4. Total demand results from the sum of individual demand

Example:

IN the below table are presented the individual demands for a product coming from two households (D_1 and D_2). What will be the total demand for that specific good?
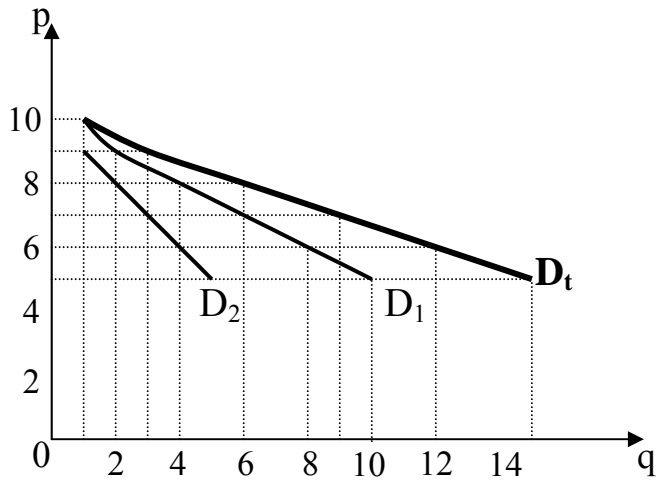
P	D_1	D_2	D_t
10	1	-	1
9	2	1	3
8	4	2	6
7	6	3	9
6	8	4	12
5	10	5	15

Total demand for the product is the sum of individual demands for each price level.

5. Present the content and the formation of consumer surplus:

Consumer surplus: $RC = \sum \Delta q * (p_i - p_E)$

for $\forall p_i > p_E$

6. In the case of inferior goods the value of elasticity – regarding price or income – will be always negative.

a) The demand increases as result of increasing price, and vice versa:

$\Delta Q\% > 0$ when $\Delta P\% > 0$,
meaning $\Delta q > 0$, $\Delta p > 0$
or
$\Delta Q\% < 0$ when $\Delta P\% < 0$,
meaning $\Delta q < 0$, $\Delta p < 0$
so $e_{cp} < 0$.

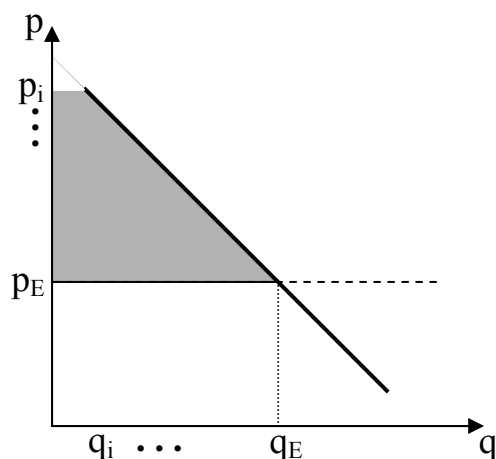*b) Demand decrease for the increase of income, and vice versa:*

$\Delta Q\% < 0$ when $\Delta Y\% > 0$,
meaning $\Delta q < 0$, $\Delta y > 0$
or
$\Delta Q\% > 0$ when $\Delta Y\% < 0$,
meaning $\Delta q > 0$, $\Delta y < 0$
so $e_{cy} < 0$

Solved exercises:

1. On the basis of data from the 4th example, and with a market price of 7, what is consumer surplus? How much is for each household?

Solution:

$$RC = \sum \Delta q * (p_i - p_E) = \sum (p_i - p_E) * (q_i - q_{i-1})$$

$RC_T = (10 - 7) * (1 - 0) + (9 - 7) * (3 - 1) + (8 - 7) * (6 - 3) = 3 + 4 + 3 = 10$
from which:
$RC_1 = (10 - 7) * (1 - 0) + (9 - 7) * (2 - 1) + (8 - 7) * (4 - 2) = 3 + 2 + 2 = 7$
$RC_2 = (9 - 7) * (1 - 0) + (8 - 7) * (2 - 1) = 2 + 1 = 3$

2. The demand curve for a product is the following function:
$$q = 2 / p$$
    A) What is the elasticity coefficient?
    B) What kind of elasticity do we have?

Solution:

$$e_{cp} = -\frac{\partial q}{\partial p} \cdot \frac{p}{q}$$

$$\frac{\partial q}{\partial p} = \left(2p^{-1}\right)' = -2p^{-2} = -\frac{2}{p^2}$$

$$e_{cp} = -\left(-\frac{2}{p^2}\right) \cdot \frac{p}{\dfrac{2}{p}} = 1$$

   - *unitary elastic*

3. The demand function for product A is:
$$q_A = 15000 - 500p_A + 5Y$$
Where: Y = income of the consumer
    If p_A = 30 and Y = 15000, find out all the coefficients for elasticity
and explain each elasticity
Solution:
   - *Quantity demanded A: q_A = 15000 - 500*30 + 5*15000 = 75000*
   1) Elasticity regarding price for p_A = 30:
       $q_A (p_A) = 15000 - 500p_A + 5*15000 = 90000 - 500p_A$
$$e_{cp(A)} = -\frac{\partial q_A}{\partial p_A} \cdot \frac{p_A}{q_A} = -(90000 - 500p_A)' \frac{30}{75000} = -(-500)\frac{1}{2500} = 0,2$$
               - Inelastic demand
   2) elasticity regarding income:
       $q_A (Y) = 15000 - 500*30 + 5Y = 5Y$
$$e_{cAB} = \frac{\partial q_A}{\partial Y} \cdot \frac{V}{q_A} = (5Y)'\frac{15000}{75000} = 5*\frac{1}{5} = +1$$
               - Unitary elasticity

Multiple choices:

1. True or false:
   1. The needs and buying possibilities are the one that establishes a certain level of the quantity demanded.
   2. The basic goods are also inferior goods.
   3. A change in price will determine a movement of the demand curve.
   4. The rigid demand is a parallel with the quantities line.
   5. The decrease of quantity demanded for a good can be caused by an increase in price for that specific good.
   6. The individual demand curves have a negative slope, while the total demand curves have one positive.
   7. The elastic demand curve slope is negative, and for the inelastic one is positive.
   8. Unitary elasticity is referring to a situation in which there is a single demand elasticity.
   9. The difference between complementary and substitute goods can be done with the help of crossed elasticity.
   10. The difference between inferior and regular goods can be done with the help of elasticity regarding income.
   11. The quantity from inferior goods is increasing as the income decreases.
   12. Substitute goods have always the same elasticity of demand in respect to price.
   13. If we anticipate an increase of prices that the actual demand will increase.
   14. For each product a consumer will benefit of consumer's surplus.

To be solved:

1. What kind of elasticity do we have if in the case that the price increases from 200 to 220, the quantity demanded decreases from 100000 units to 88000? What if the quantity demanded decreases only with 5000?

2. The quantity demanded for a product A has a constant elasticity regarding price of e_{cp} = 1,5. Knowing that at a price of 2000 the demanded quantity is 4500 units, find out:
   A) What will be the increase of the demand if the price decreases by 10%?
   B) What will be the new level of the demand?
   C) What is and how will evolve the total revenue for the company?

3. The quantity demanded for the product A has a constant elasticity regarding price of e_{cp} = 0,8. Knowing that at a price of 2000, quantity demanded is 4500, to be determined:
   A) What will be the decrease of demand at an increase of price by 10%?
   B) What will be the new level of the quantity demanded?
   C) What is and how will evolve the total revenue for the selling company?

4. In a certain period the price and the quantity demanded is the next:

Price	500	600	700
Quantity demanded	2000	1800	1400
$(p\uparrow)$ e_{cp}			
$(p\downarrow)$ e_{cp}			
elasticity			

   A) What is the elasticity regarding price if the price increases from 500 to 600 and then from 600 to 700?
   B) What if decreases from 600 to 500, and from 700 to 600?
   C) What elasticity do we have?

5. The quantity demanded for product A has a constant elasticity regarding income of e_{cy} = 1. Knowing that at a price of 100 quantity demanded is 15000 pc, to be found:
   A) What will be the change for quantity demanded if the income for consumers will decrease with 10%?
   B) What will be the level of quantity demanded?
   C) What will be the change in total revenue for the company?

6. Same requests for the elasticity regarding income (e_{cy}) of 1,25

7. Because the price for the product A doubled, the demand for the products A, B and C modified as:

Price of product A	Quantity demanded (units)		
	A	B	C
100	90	60	180
200	70	120	140
e_{cp}		*	*
Elasticity		*	*
e_{cxy}	*		
merchandise	*		

A) Find out the elasticity coefficient regarding price and the crossed elasticity.

B) What kind of relations can we establish between goods?

8. The demand for product A comes from three households with the next individual demand function:

$$D_1 = 50\text{-}p, D_2 = 60\text{-}p \text{ și } D_3 = 40\text{-}p$$

A) Fid out the total demand for product A

B) Draw the graph for individual demand and total demand

Price	Total demand	Quantity demanded (pieces)		
		D_1	D_2	D_3
10				
20				
30				
40				
50				
60				

9. Find out on the basis of data from the previous exercise the elasticity coefficient regarding price.

p	C_T	D_1	D_2	D_3
10 → 20				
20 → 30				
30 → 40				
40 → 50				
50 → 60				

10. Total demand for a merchandise is:

Price	10	9	8	7	6
Quantity demanded	1	2	3	4	5
$(p\uparrow)\ e_{cp}$	*				*
$(p\downarrow)\ e_{cp}$	*				*

A) Calculate the elasticity for each level

B) If the market price is 7, what is the level of the consumer's surplus?

11. The demand curve for a product is the function:

$$q = 1 / \sqrt{p}$$

A) What is the elasticity coefficient?

B) What kind of elasticity do we have?

12. Same question for:

$$q = 1 / p^2$$

13. The demand function for the product A is:

$$q_A = 10000 - 350\ p_A + 200\ p_B + 0{,}1\ Y$$

If $p_A = 20$, $p_B = 10$ and $Y = 10000$, find out all the elasticity possible and explain the elasticity type. What will happen if the income will drop to 5000?