



Antal blad /  
Number of sheets

11 ✓

# TENTAMEN / EXAMINATION

- Anvisningar:** Skriv din anonymitetskod på varje blad.  
Endast en uppgift får lösas på varje blad.  
Var vänlig skriv tydligt!
- Instructions:** Write your anonymous code on each sheet.  
Answer only one question on each sheet.  
Please write clearly!

Vänligen texta anonymitetskoden i textboxen enligt exempel nedan!  
Please write the Anonymous Code clearly in the textbox like example below!

**Bokstäver/Letters:**

A-B-C-D-E-F-G-H-I-J-K-L-M-N-O  
P-Q-R-S-T-U-V-W-X-Y-Z-Å-Ä-Ö

**Siffror/Numbers:**

Ø-1-2-3-4-5-6-7-8-9

Exempel: 

A	B	C	1	7	Ø	-	Ø	1	7
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NEGBØ1-Ø34

Kurskod + Kurs / Course Code + Course:

Miljöekonomi B

Delkurs / Part course:

Anonymitetskod / Anonymous code = Kurskod + kodnr / course code + code number									
N	E	G	B	Ø	1	-	Ø	3	4



Tentamensdatum / Examination date:	
14-16	

## Behandlade uppgifter / Solved problems

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
X	X	X	X	X	X	X								
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

## Ifylles av lärare / To be completed by the examiner

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
10,5	3	4	2	0,5	7,25									
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

Poäng / Marks gained: 15,5

Betyg / Grade: G

kk  
Examin. lärare / Kursansvarig signatur / Signature of the examiner

Max poäng / Total marks gained: \_\_\_\_\_

Namnförtydligande / Clarification of the signature

För Gk poäng / Marks gained to be passed: \_\_\_\_\_



Negb01-034

1

1.  $P_L = W$

T = time

$T = 12 = L + A$

A = At work

$C_L(W, L) = W \cdot L$

Cost for leisure.

where is your answer?  $\emptyset$

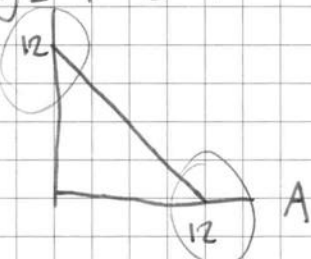
Uppgift nr /  
 Question no:

Poäng / Points  
 awarded:

Lärarens  
 anteckning  
 Examiner's remarks:

(b)  $T = L + A$

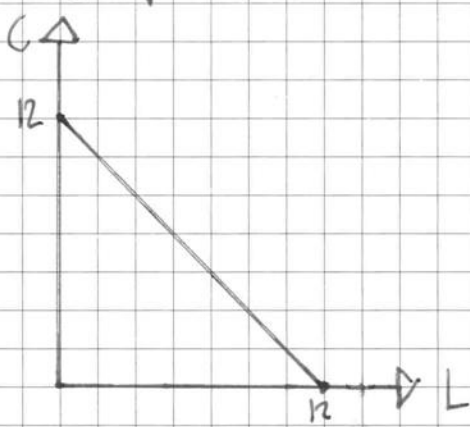
A = At work



2.  $\emptyset$

(c)  $U = \sqrt{C \cdot L}$

$U^2 = C \cdot L$       $L = \frac{U^2}{C}$



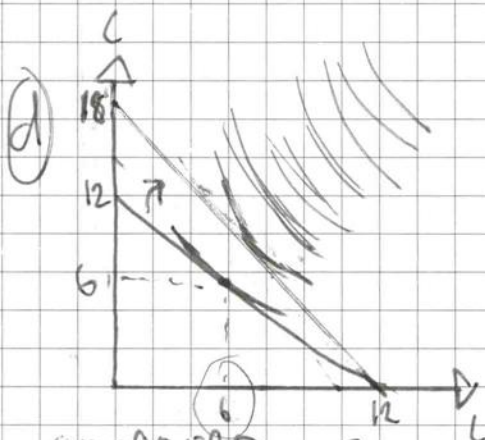
$C = \frac{U^2}{L}$

$U = C^{0,5} \cdot L^{0,5}$

$U'_L = 0,5 C^{0,5} \cdot L^{-0,5}$

$U'_C = 0,5 C^{-0,5} \cdot L^{0,5}$

answer?  $\emptyset$



Wage increase results in her possibility to consume more but her <sup>possibility</sup> time for leisure is not changed

Since the  $MRS = \frac{MU_L}{MU_C}$

$\frac{0,5 C^{0,5} L^{-0,5}}{0,5 C^{-0,5} L^{0,5}} = \frac{C}{L}$

she values consumption and leisure the same. But now she can afford more

0,5





1d) consumption but with the same leisure.

$$x(m, p) - x(m, p) = \text{sub} \quad ? \quad \text{don't know}$$

$$x(m, p') - x(m, p) > \text{inc} \quad ? \quad \text{what you're doing.}$$

She still wants the amounts of  $C$  and  $L$  to be the same to maximize  $U$ . To do this she will change  
 example 50% pay raise.

Earlier she works  $L=7$

$$\frac{6 \cdot 1}{6 \cdot 1} = 1 \quad \text{now} \quad L=1,5 \quad ?$$

now  $L$  is still 12 but max  $C$  is now 18

$$\frac{P_C \cdot C}{P_C \cdot C} = 1$$

$$\frac{1,5C}{L} = 1$$

$$1,5C = L$$

$$L = 12 - C$$

$$1,5C = 12 - C$$

$$2,5C = 12$$

$$C = 4,8$$

$$L = 12 - C$$

$$L = 7,2$$

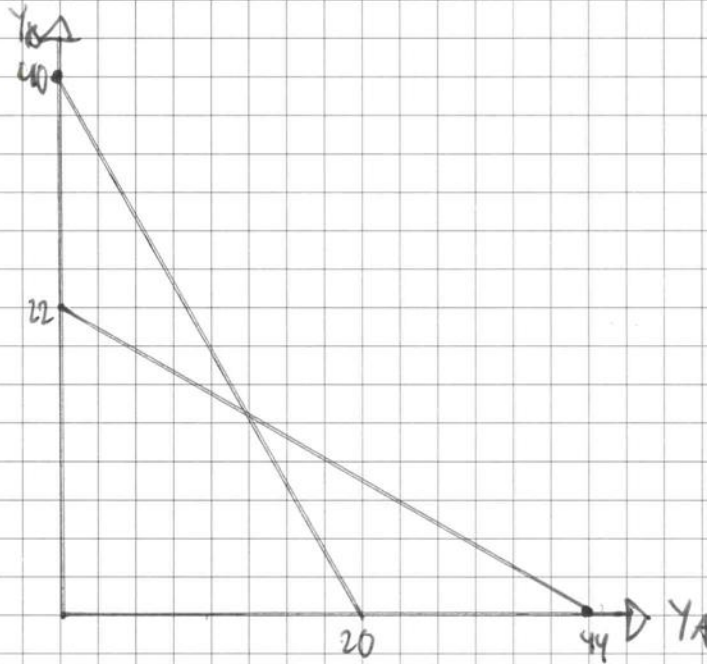


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3

2.  $P = 100 - 2Y$   
 $Y = 50 - \frac{P}{2}$   
 $Y = Y_A + Y_B$   
 $MC_A = 12$   
 $MC_B = 20$

$r = \text{revenue}$   
 $\Pi = \text{profit}$



$r_A = P \cdot Y_A$

$r_B = P \cdot Y_B$

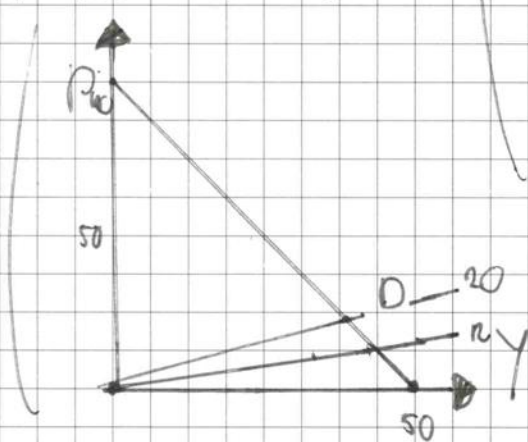
$\Pi_A = r_A - C_A = r_A - Y_A \cdot 12$

$\Pi_B = r_B - C_B = r_B - Y_B \cdot 20$

$\Pi_A = Y_A (P - 12)$

$\Pi_B = Y_B (P - 20)$

$P = 100 - 2Y_A - 2Y_B$



$C_A = MC_A \cdot Y_A$  då vi ej har pris

$C_B = MC_B \cdot Y_B$

$MC = P$  i kompletta marknad

$MC_{tot} = P$

$32 = 100 - 2Y$

$2Y = 68$

$Y = 34$

$12 = 100 - 2Y_A - 2Y_B$

$20 = 100 - 2Y_A - 2Y_B$

$Y_A = 44 - Y_B$

$Y_B = 40 - Y_A$

Jag skall på något vis  
 sätta de två varandra  
 men jag minns ej hur.  
 Jag tror jag ska

den vara med avseende på  $Y_A/Y_B$  men minns ej det  
 heller.

Nej

Uppgift nr /  
Question no:

Poäng / Points  
awarded:

0,5

Lärarens  
anteckning  
Examiner's remarks:

Du skriver  
inte  
vad du  
gör -  
Svårare  
ge  
poäng  
då.





3. a) No. Since neither row or column will pick the same choice whatever the other player picks there is no dominant strategies.

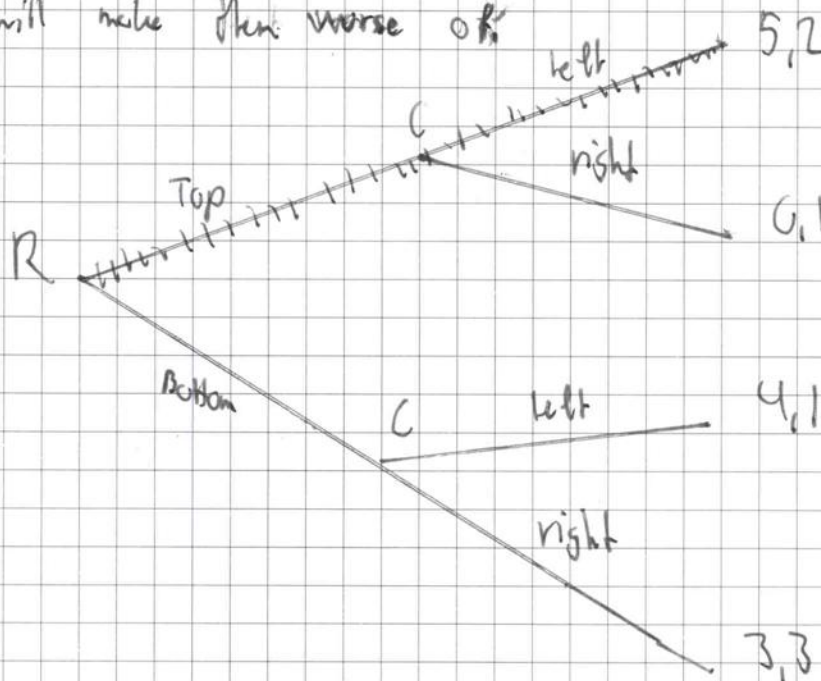
b) The payoff boxes  $5,2$  (Top, left) and  $3,3$  (Bottom, Right) are both Nash equilibriums. That means that neither player will change their choice when they are there if the other person doesn't.

Consider Row picked Top. Column now can decide if he wants a payoff that is 2 or 1. He picks 2 that is left.

Consider Column picked right. Row can now decide if he wants a payoff that is 0 or 3. He picks 3 that is bottom.

One person moving from either of these equilibriums will make them worse off.

c)





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5

3

c) Row knows what choices column will have if he picks top/bottom and Column will pick what is best for him in both cases.

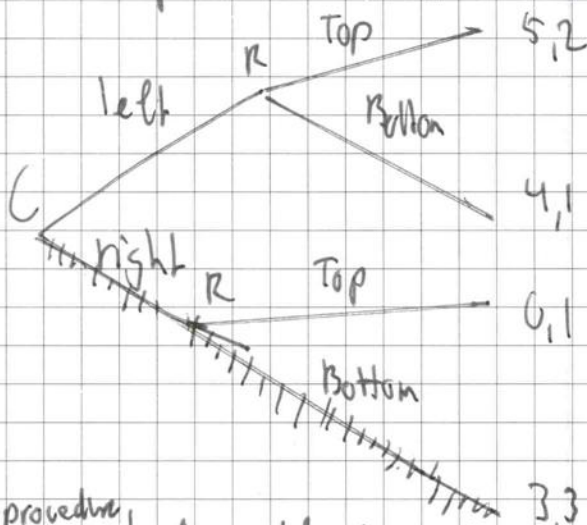
If row picks top column will choose between 2/1. Column picks 2 and row gets 5 payoff  
 Top = 5 for Row

If row picks bottom Column will choose between 1/3. Column picks 3 and row gets 3 payoff  
 Bottom = 3 for Row.

Row can choose between 5 or 3 payoff.

He picks 5 and therefore Top. Top/left

d)



Some procedure before. If C picks left R will choose between 5, 4, he picks 5 and left = 2 payoff for column

If C picks right R will choose between 3/0. He picks 3. Right = 3 for column. Column decides between 3/2 picks 3. Right/Bottom.

Uppgift nr /  
 Question no: 3

Poäng / Points  
 awarded:

Lärarens  
 anteckning  
 Examiner's remarks:





4. a) i)  $Y(K, L) = 2L + K = f(2L + K)$

$f'$  = CRS Constant return to scale. R 0,5

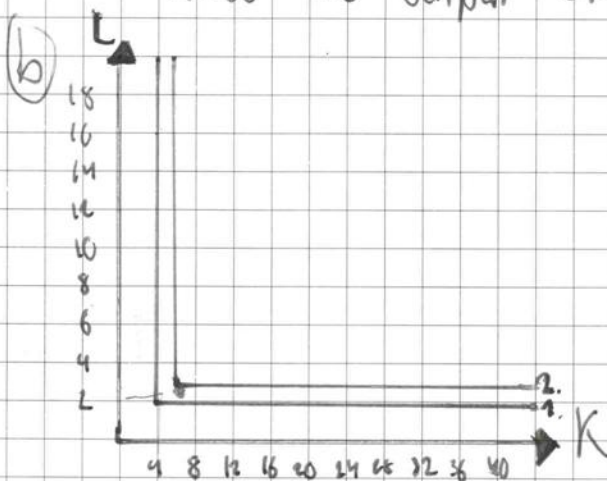
If we output the inputs with  $t$  will we get more or less or the same output change. In this case  $f'$  the same.

ii)  $MP_L$   $MP_K$   $MP_L = 2$  R 0,5

$(K = Y - 2L)$   $MP_K = 1$   
 $L = 0,5Y - 0,5K$

iii)  $20 = 2L + K$  What amounts of  $L, K$  do we need  
 $K = 20 - 2L$  to have as input to generate  
 20 in hourly output. R 0,5

The isoquant denotes all the possible values for this to be so. (ex  $K=10$   $L=5$ ). This technology relies on the person-hours since one person hour generates twice the output of a machine hour.



1.  $Y=4$  isoquant
2.  $Y=6$  isoquant

0,75



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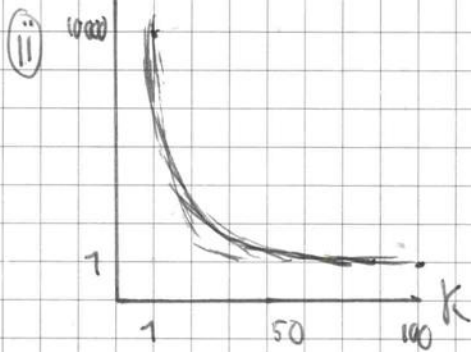
7

9c. i)  $Y(K, L) = (K)^{0,5} (L)^{0,25}$

$$Y(K, L) = 1^{0,5} K^{0,5} 1^{0,25} L^{0,25}$$

$$Y = 1^{0,75} K^{0,5} L^{0,25}$$

input changed by 1 and output with only 1<sup>0,75</sup>. DRS Decreasing return to scale.



$$Y(K, L) = K^{0,5} L^{0,25}$$

iii)  $Y(K, L) = K^{0,5} L^{0,25}$

$$MP_L = 0,25 K^{0,5} L^{-0,75}$$

$$MP_K = 0,5 K^{-0,5} L^{0,25}$$

The law of diminishing returns

holds up. When we put in more

we get more back, but at a decreasing rate.

We can see this by the fact that we have no exponent that is higher than 1.

iv)  $MRTS = MP_L / MP_K$

$$MRTS = \frac{0,25 K^{0,5} L^{-0,75}}{0,5 K^{-0,5} L^{0,25}} = \frac{0,5 K}{L}$$

It shows how much L you need to add if you reduce the other

input to gain the same result.

Uppgift nr /  
 Question no:

Poäng / Points  
 awarded:

Lärarens  
 anteckning  
 Examiner's remarks:

0,5

equation?

0,25

0,5

0,5





Ange anonymitetskod / Write your anonymity code  
(Vid icke anonym tentamen ange kurskod + namn + personnummer)  
(For non-anonymous exams write the course code + name + civic registration number)

NB6B01-034

Löpande sidnr  
Consecutive no:

8

Uppgift nr /  
Question no:

Poäng / Points  
awarded:

Lärens  
anteckning  
Examiner's remarks:

$$5. U(x,y) = x^{0,5} + 2y^{0,5}$$

$$P_x = 10$$

$$P_y = 15$$

$$m = 2970$$

$$U'_x = 0,5x^{-0,5}$$

$$U'_y = y^{-0,5}$$

$$2970 = xP_x + yP_y$$

$$? \quad 2970 = 10x + 15y$$

$$L(x,y,\lambda) = x^{0,5} + 2y^{0,5} - \lambda(10x + 15y - 2970)$$

$$? \quad L'_x = 0,5x^{-0,5} - 10\lambda$$

$$? \quad L'_y = y^{-0,5} - 15\lambda$$

Foci 1,2,3

$$0,75x^{-0,5} = 15\lambda$$

$$0,75x^{-0,5} = y^{-0,5}$$

$$\frac{0,75}{x^{0,5}} = \frac{1}{y^{0,5}}$$

$$0,75y^{0,5} = x^{0,5}$$

$$0,75^2 y = x$$

$$0,5625y = x$$

$$2970 = 10 \cdot 0,5625y + 15y$$

$$2970 = 20,625y$$

$$y = 144$$

$$2970 = 10x + 15 \cdot 144$$

$$2970 = 10x + 2160$$

$$x = 81$$

R



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Löpande sidnr  
Consecutive no:

9

a) a) A good is inferior if when income is gained you consume less of it.



R

Uppgift nr /  
Question no:

Poäng / Points  
awarded:

Lärarens  
anteckning  
Examiner's remarks:

b) a) a good that is neither excludable or

ändlig. A public good can be the streetlights, the roads we drive on, the air we breathe or a lighthouse.

b) a) A quasilinear utility function is a function where one variable isn't affected by income, it looks in a specific way

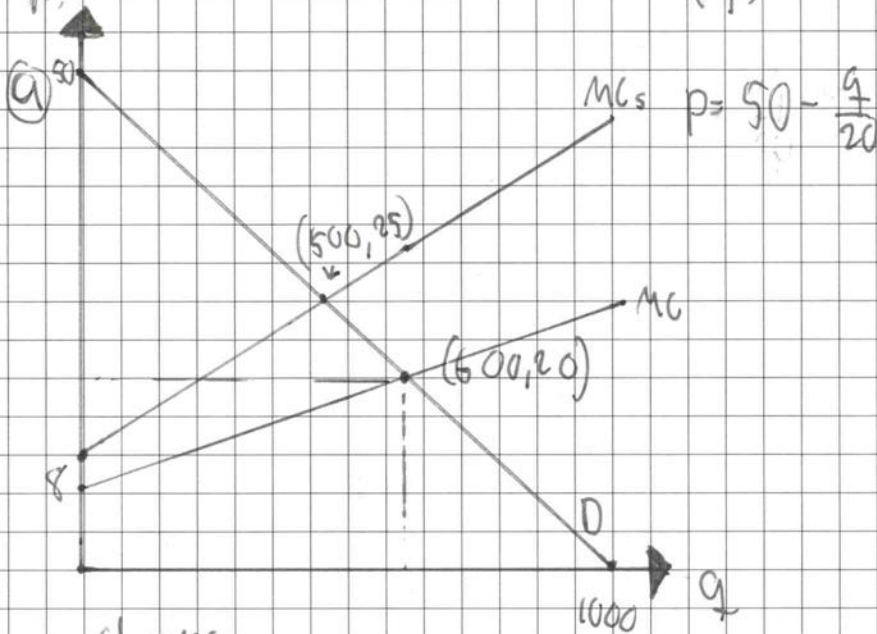
men definition  
känns?

b)





7. Market demand  $q = 1000 - 20p$   
 p. Product cost function industry  $C(q) = 500 + 8q + 0,01q^2$



$$C'_q = MC$$

$$MC = 8 + 0,02q$$

$MC = P$  in competitive market

$$8 + 0,02Q = 50 - \frac{Q}{20}$$

$$0,02Q = 42 - \frac{Q}{20}$$

$$0,02Q + \frac{Q}{20} = 42$$

$$Q + 2,5Q = 2100$$

$$Q = 600$$

$$P = 50 - \frac{600}{20}$$

$$P = 20$$

b)  $C_p(q) = 2q + 0,005q^2$

$$MC_p = C'_p$$

$$MC_p = 2 + 0,01Q$$

$$MC_s = MC_p + MC$$

$$MC_s = 2 + 0,01Q + 8 + 0,02Q$$

$$MC_s = 10 + 0,03Q$$

Uppgift nr /  
 Question no:

Poäng / Points  
 awarded:

Lärarens  
 anteckning  
 Examiner's remarks:

R

R



7. (c)

$$MC_s = P$$

$$10 + 0,08Q = 50 - 0,05Q$$

$$0,08Q = 40$$

$$\underline{Q = 500}$$

$$P = 50 - 0,05 \cdot 500$$

$$\underline{P = 25}$$

(d) Because the lump sum tax will result in the firms  $C(q)$  which will move their cost curve upwards resulting in less  $V$  for society.

(e) Internalize the external costs,

$$C(q) = 500 + 8Q + 0,01q^2 + tq$$

$$MC_t = 8 + 0,02Q + t$$

$MC_t = P$  in competitive market and we want  $P$  to be 25 according to the earlier calculations and  $Q = 500$

$$25 = 8 + 0,02 \cdot 500 + t$$

$$25 = 8 + 10 + t$$

$$\underline{t = 7}$$

Uppgift nr /  
Question no:

Poäng / Points  
awarded:

Lärarens  
anteckning  
Examiner's remarks:

R

✓

R