COMM 220
MIDTERM PROBLEM SESSION

COMM 220
Final Review Outline
2015
Kevin Liu
Lyuanch@live.concordia.ca

[Chapter 1] Market Analysis

① Positive v.s. Normative Analysis
(Cause & Effect) ("should")

② Competitive v.s. Non-competitive Markets
(Price takers → consumers) ("monopoly")

③ Real v.s Nominal Price

		1970 (base)	2015 (non-base)
Nominal ←	Price	$30	$80
	CPI	125	325
Real ←	Price	a	b

Base year: Nominal Price = Real Price
a = $30

Non-base year: Calculation needed
$b = \frac{125}{325} \times 80 = \$30.769$

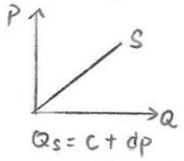
④ Percentage Change

$$\Delta\% = \frac{\text{New} - \text{old}}{\text{Old}}$$

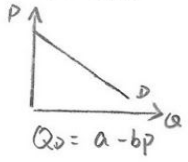
- Real Price = $\frac{\text{CPI in base year}}{\text{CPI in non-base year}}$ x nominal price of non-base year
- $\Delta\%$ in CPI = $\Delta\%$ in Real Price

[Chapter 2] Basic Supply & Demand

① Supply & Demand Curve



$Q_S = c + dp$



$Q_D = a - bp$

② Influencing Factors:

- Supply: Cost of production, interest rate, technology, expectation ...
- Demand: Income, season, wether, price of complements/substitutions, interest rates...

③ Elasticity

1) Price Elasticity (E^P)

$$E^P = \frac{\%\Delta Q}{\%\Delta P} = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

- $E^P > 1$ Elastic
- $E^P < 1$ Inelastic
- $E^P = 1$ Unit elastic
- $E^P = 0$ Completely Inelastic
- $E^P = \infty$ Infinitely Elastic

2) Income Elasticity (E^I)

$$E^I = \frac{\%\Delta Q}{\%\Delta I} = \frac{\Delta Q}{\Delta I} \times \frac{I}{Q}$$

- $E^I > 0$ Normal Goods
- $E^I = 0$ Neutral Goods
- $E^I < 0$ Inferior Goods ("Potatoes")

3) Cross-Price Elasticity ($E_{Q_A P_B}$)

$$E_{Q_A P_B} = \frac{\%\Delta Q_A}{\%\Delta Q_B} = \frac{\Delta Q_A}{\Delta P_B} = \frac{P_A}{Q_B} \times \frac{\Delta Q_B}{\Delta P_A}$$

- $E_{Q_A P_B} > 0$ Substitutions
- $E_{Q_A P_B} < 0$ Complements

4) Arc Elasticity (E_{Arc})

$$E_{Arc} = \frac{\Delta Q}{\Delta P} \cdot \frac{\bar{P}}{\bar{Q}}$$

$$= \frac{\%\Delta Q}{\%\Delta P} \rightarrow \frac{Q_2 - Q_1}{(Q_2 + Q_1)/2} \Big/ \frac{P_2 - P_1}{(P_2 + P_1)/2}$$

④ Given: $\begin{cases} Q_D = a - bP \\ Q_S = c + dP \end{cases}$

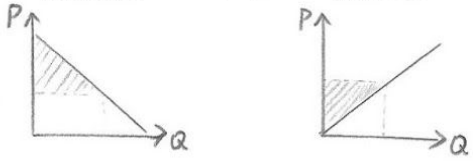
1) Equilibrium Point?
2) If Q_D increased by 10%, new equilibrium point?
3) If P_D increased by 10%, new equilibrium point?

- When they ask you to calculate new equilibrium point if P changed

REFORMAT $Q = a - bP \Rightarrow P = \frac{a}{b} - \frac{Q}{b}$ then times percentage change

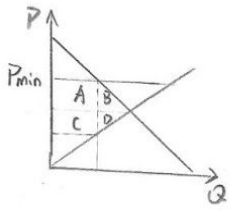
[Chapter 3] Influence on Supply & Demand

① Consumer V.S. Producer Surplus



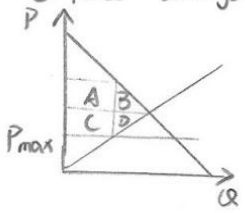
- Δ Social Welfare = ΔCS + ΔPS + Government Revenue − Cost to the government
- Deadweight Loss = − Δ Social Welfare

② Price Floor



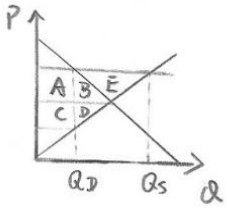
ΔCS = −A−B
ΔPS = A−D
DWL = B+D
ΔWF = −B−D

③ Price Ceilings



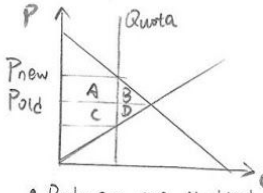
ΔCS = C−B
ΔPS = −C−D
DWL = B+D
ΔWF = −B−D

④ Price Support



ΔCS = −A−B
ΔPS = A+B+E
Cost to gov. = $(Q_S - Q_D) \times P$
$\Delta WF = E - (Q_S - Q_D) \times P$

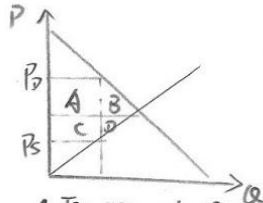
⑤ Quotas (limit the quantity)



ΔCS = −A−B
ΔPS = A−D
DWL = B+D
ΔWF = −B−D

- Producers are limited to produce less, as a result, the price goes up since the demand is high

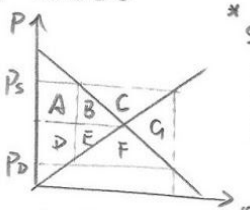
⑥ Taxes



* Tax = $P_D - P_S$
ΔCS = −A−B
ΔPS = −C−D
Gov. Revenue = A+C = Tax × Quantities
DWL = B+D

- Tax may not separate evenly to demand & supply

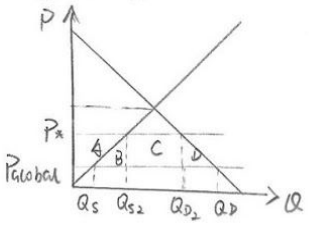
⑦ Subsides



* Subsides = $P_S - P_D$
ΔCS = D+E+F
ΔPS = A+B+C
Cost to gov. = A+B+C+D+E+F+G
ΔWF = −G

- P_S, P_D are opposite from "taxes"

⑧ Tariff



P_X : The global price with tariff
Tariff = $P_X - P_{Global}$
ΔCS = −A−B−C−D
ΔPS = A
Gov. Revenue = C = $(Q_{D_2} - Q_{S_2}) \times$ Tariff
DWL = B+D

【Chapter 4】 Labour Market

① Job Market { National / Internal / Local

② Labour Force = Employed + Unemployed

③ Not in Labour Force = Retired + Under 15 + Not looking for work ...

④ Labour Force Participation = $\frac{\text{Labour Force}}{\text{Population}}$

⑤ Unemployment Rate = $\frac{\text{Unemployed}}{\text{Labour Force}}$

⑥ When capital price goes down :

Scale Effect	Substitute Effect
Price of K ↑	Price of K ↓
Production cost ↓	Substitute L for K
Price for firms charging ↓	Labour demand ↓
Consumers' consume ↑	
Production ↑	
Labour demand ↑	

- Only in the long run

【Chapter 5】 Marginal Revenue

① Short-run: $MR(MRP_L) = MC(w)$

$MRP_L = \text{Price} \times MP_L$

$MRP_K = \text{Price} \times MP_K$

Max Revenue: $MRP_L = w$

② Long run:

$$\frac{MP_L}{MP_K} = \frac{w}{c} = MRTS$$

③ Total Cost = $w \times L + c \times K$

Q.1. The table below shows the number of cakes that could be baked daily at a local bakery, depending on the number of bakers.

Number of bakers	Number of cakes
0	0
1	10
2	18
3	23
4	27

a. Calculate the marginal product of labor.
b. Do you observe the law of diminishing marginal returns? Explain.
c. Suppose each cake sells for $10. Calculate the marginal revenue product of labor.
d. Draw the marginal revenue product of labor curve, which is the demand curve for bakers.
e. If each baker is paid $80 per day, how many bakers will the bakery owner hire, given that the goal is to maximize profits? How many cakes will be baked and sold each day?

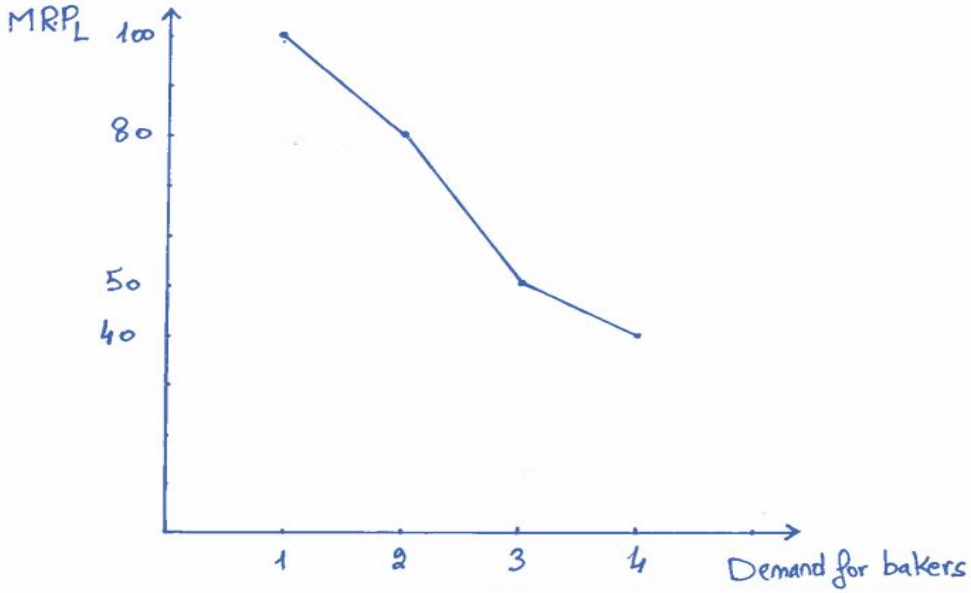
Q.1.a. Marginal product of labor: $MP_L = \frac{\Delta Q}{\Delta L} = \frac{\Delta(\text{Number of cakes})}{\Delta L}$

Nb. of bakers	Nb. of Cakes	MP_L	MRP_L
0	0	—	—
1	10	$\frac{10-0}{1-0} = 10$	$10 \times 10 = 100$
2	18	$\frac{18-10}{2-1} = 8$	$8 \times 10 = 80$
3	23	$\frac{23-18}{3-2} = 5$	$5 \times 10 = 50$
4	27	$\frac{27-23}{4-3} = 4$	$4 \times 10 = 40$

b. Yes. We can clearly notice that the marginal product of labor declines as more bakers are hired.

c. Marginal revenue product of labor: $MRP_L = MP \times MR$ $\quad MR = \$10$

d. The demand for labor (baker) is the MRP_L curve.



Q.1.e. (Continued)

If each baker is paid \$80 (w) per day $\rightarrow MRP_L = w = \$80$. The bakery would hire 2 bakers and produces and sells 18 cakes per day.

Q.4. The output of workers at a factory depends on the number of supervisors hired (see below). The factory sells its output for $0.50 each, it hires 50 production workers at a wage of $100 per day, and needs to decide how many supervisors to hire. The daily wage of supervisors is $500 but output rises as more supervisors are hired, as shown below. How many supervisors should it hire?

Supervisors	Output (units per day)
0	11000
1	14800
2	18000
3	19500
4	20200
5	20600

Q.4. The firm will hire three supervisors since the marginal revenue generated from hiring the three supervisors exceeds $500 while the marginal revenue generated from hiring the fourth supervisor is less than $500 (or marginal cost)

Q.4. (Continued)

Nb. of supervisors	MC	Output	MP_L	MR
0	—	11 000	—	—
1	$500	14 800	14800 - 11000 = 3800	0.5 x 3800 = $1900
2	$500	18 000	3200	0.5 x 3200 = $1600
3	$500	19 500	1500	0.5 x 1500 = $750
4	$500	20 200	700	0.5 x 700 = $350
5	$500	20 600	400	0.5 x 400 = $200

Problem 2

The JMSB Press produces notepads in its local shop. The company can rent its equipment and hire workers at competitive rates. Equipment needed for this operation can be rented at $24 per hour, and labour can be hired at $12 per worker hour. The company has allocated $100,000 for the initial run of notepads. The production function using available technology can be expressed as: $Q = 0.25K^{0.2}L^{0.8}$, where Q represents notepads (boxes per hour), K denotes capital input (units per hour), and L denotes labour input (units of worker time per hour).

a) Find the optimal input ratio in the long term.
b) Determine the appropriate input mix to get the greatest output for a cost of $100,000 for a production run of notepads. Compute the level of output.
c) Determine the labour demand if production were increased by 200 boxes per hour in the short term. Calculate the new cost of production.
d) Suppose the increase in the production became permanent (i.e., in the long term). Determine the optimal input mix. Calculate the cost of production and the scale effect in the employment of labour.
e) Draw the isoquants and isoexpenditure lines in parts (b) and (d), and illustrate the scale effect.

Answer:

a) $MP_L = 0.25*0.8*K^{0.2}L^{-0.2}$

$MP_K = 0.25*0.2*K^{-0.8}L^{0.8}$

$$MRTS = \frac{MP_L}{MP_K} = \frac{0.25*0.8*K^{0.2}L^{-0.2}}{0.25*0.2*K^{-0.8}L^{0.8}} = \frac{4K}{L}$$

$$\frac{MP_L}{MP_K} = \frac{w}{c} = \frac{12}{24} \rightarrow \frac{4K}{L} = \frac{1}{2} \rightarrow \frac{K}{L} = \frac{1}{8} \rightarrow L = 8K$$

b) $100{,}000 = 12L + 24K = 12(8K) + 24K = 120K$

$K = 100000/120 = 833.3333$ units

$L = 8*833.3333 = 6666.6667$ units

$Q = 0.25*833.3333^{0.2}*6666.6667^{0.8} = 1{,}099.59$ boxes

c) New $Q = 1099.59 + 200 = 1299.59$ boxes

In the short term, $K = 833.3333$ units and $L = [1299.59/(0.25*833.3333^{0.2})]^{1/0.8} = 8{,}215.3913$ units

The new cost of production $= 12*8215.3913 + 24*833.3333 = \$118{,}584.6948$

d) In the long term, $Q = 1299.59 = 0.25K^{0.2}L^{0.8} = 0.25K^{0.2}(8K)^{0.8} = 0.25*8^{0.8}*K$

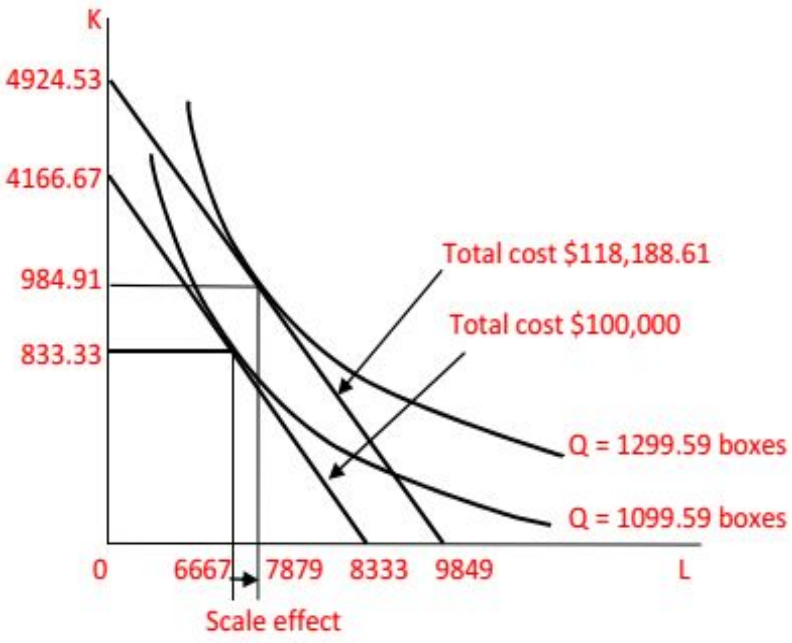
$K = 1299.59/(0.25*8^{0.8}) = 984.9050$ units

$L = 8*984.9050 = 7{,}879.2404$ units

Cost of production = $12*7879.2404 + 24*984.9050 = \$118{,}188.61$

Scale effect in the employment of labour = $7879.2404 - 6666.6667 = 1{,}212.5737$ units

e)



Consider the following production function of DVDs: $Q = K^{0.5}L^{0.5}$, where Q represents DVDs (boxes per hour), K denotes capital input (units per hour), and L denotes labour input (units of worker time per hour). The unit cost of capital and labour are $40 and $20, respectively.

a) What is the optimal input ratio of labour and capital for the production?
b) Determine the appropriate input mix to produce 800 boxes of DVDs. Compute the cost of production.
c) Suppose the government decided to offer a subsidy that would make the cost of labour $15. What is the optimal input mix to produce the same level of output, and the new cost of production? Also, compute the substitution effect in the employment of labour.
d) Draw the isoquant and isoexpenditure lines in parts (b) and (c), and illustrate the substitution effect.

Answer:

a) $MP_L = 0.5*K^{0.5}L^{-0.5}$

$MP_K = 0.5*K^{-0.5}L^{0.5}$

$MRTS = \frac{MP_L}{MP_K} = \frac{0.5 \cdot K^{0.5}L^{-0.5}}{0.5 \cdot K^{-0.5}L^{0.5}} = \frac{K}{L}$

$\frac{MP_L}{MP_K} = \frac{w}{c} = \frac{20}{40} \rightarrow \frac{K}{L} = \frac{1}{2} \rightarrow K = 0.5L$

b) $Q = 800 = K^{0.5}L^{0.5} = (0.5L)^{0.5}L^{0.5} = 0.5^{0.5}L$

$L = 800/0.5^{0.5} = 1{,}131.3709$ units

$K = 0.5*1131.3709 = 565.6854$ units

Cost of production = $20L + 40K = 20*1131.3709 + 40*565.6854 = \$45{,}254.835$

c) The cost of labour = $15

$\frac{MP_L}{MP_K} = \frac{w}{c} = \frac{15}{40} \rightarrow \frac{K}{L} = \frac{3}{8} \rightarrow K = 0.375L$

$Q = 800 = K^{0.5}L^{0.5} = (0.375L)^{0.5}L^{0.5} = 0.375^{0.5}L$

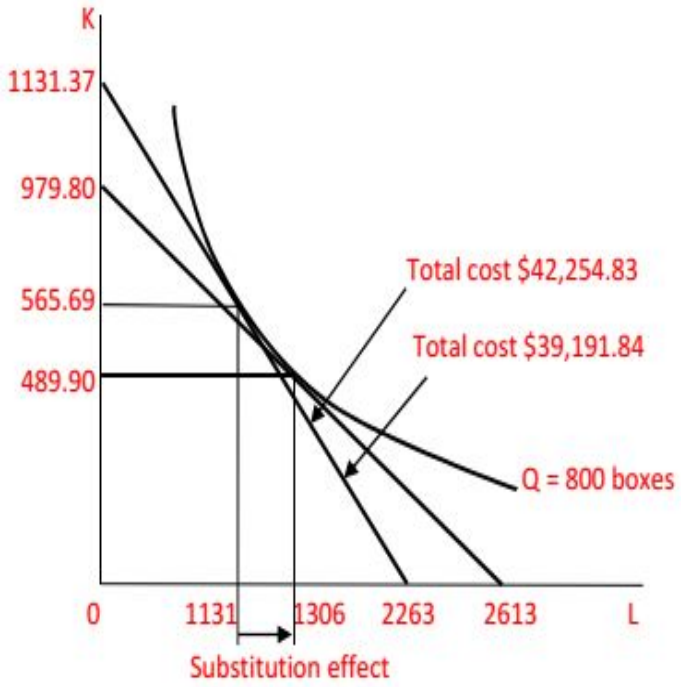
$L = 800/0.375^{0.5} = 1{,}306.3945$ units

$K = 0.375*1306.3945 = 489.8979$ units

New cost of production = 15*1306.3945 + 40*489.8979 = $39,191.8335

Substitution effect in the employment of labour = 1131.3709 – 1306.3945 =175.0236 units

d)

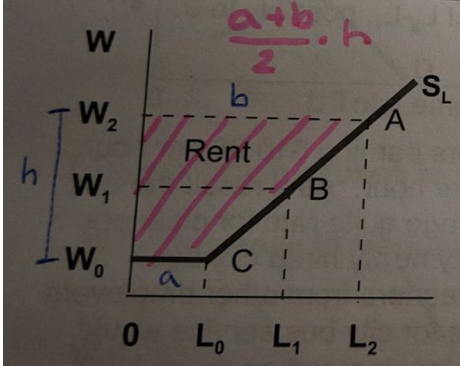


ECONOMIC RENTS:

Comparing the wage received by individual worker to a reservation wage.

A reservation wage is a wage below which the worker would refuse the job or quit. Reservation wages differ between workers as they are driven by individual preferences.

The amount by which a worker's actual wage exceeds the reservation wage is his or her **economic rent**. *You must **calculate** it by taking the area of the trapezoid between the wage and the S_L curve.*



If the wage paid to soldiers is W_2, then a soldier who would have been willing to join for wage W_0 will have an economic rent equal to the area of the trapezoid bordered by points W_2, A, C and W_0.

A soldier whose reservation wage was W_1, would economic rent equal to the area of the trapezoid bordered by points W_0, A, B and W_1.

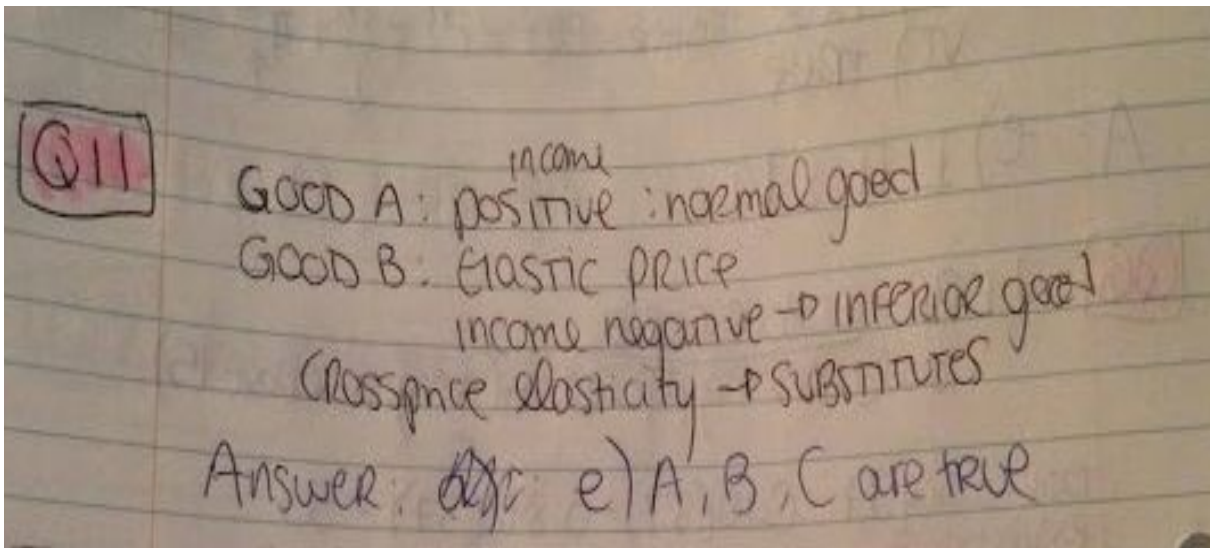
e.g. If Ls is perfectly elastic at a wage of \$10 per hour (W_0) over the first 120 workers (L_0). To attract more than 120 workers a wage higher than \$10 must be offered, for example to get 180 workers (L_1) a wage of \$15 per hour (W_1) must be offered. What is the economic rent if a wage of \$15 is employed? Answer: (120+180)/2 x (\$15-\$10) = \$750 Econ Rent

TECHNOLOGICAL CHANGE ACROSS COUNTRIES

QUESTION 11 (2 Points)

An economy is composed of two goods: Good A and Good B. The income elasticity of demand for Good A is 1.2 while the price elasticity of demand for good B is -1.2. The income elasticity for Good B is -0.3. The cross price elasticity of demand between these two products is 1.5. Further, suppose Good A's real price is $1.80 and Good B's real price is $1.49. Given that Good A's price elasticity of demand is perfectly elastic, which of the following is true?

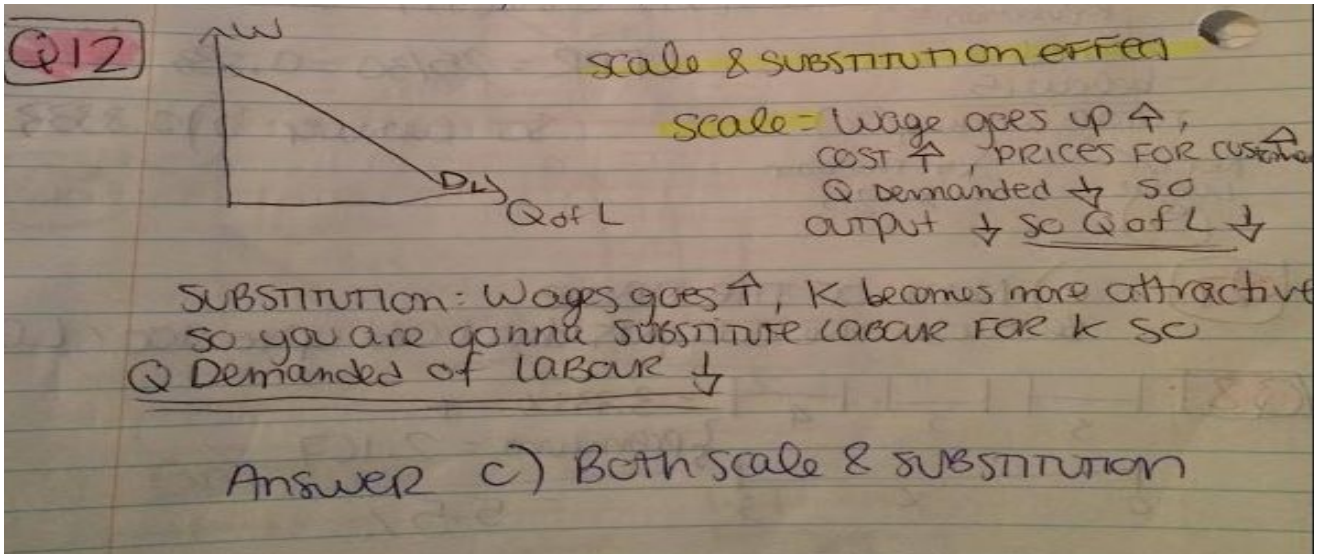
a) Good A and Good B are substitutes and Good B is an inferior good.
b) Good A and Good B are neither inelastic.
c) Good A must be that of a perfectly competitive market.
d) Both A) and C) are true.
e) Answers A), B) and C) are true.



QUESTION 12 (2 Points)

The demand for labour in the labour market typically exhibits a downward sloping curve. The most logical explanation for this includes:

a) The scale effect only.
b) The substitution effect only.
c) Both the scale and substitution effect.
d) The income effect only.
e) Both the income and substitution effect.
f) None of the above.



4. Plastic and steel are substitutes in the production of body panels for certain automobiles. If the price of plastic increases, with other things remaining the same, we would expect:
   A) the price of steel to fall.
   B) the demand curve for steel to shift to the right.
   C) the demand curve for plastic to shift to the left.
   D) nothing to happen to steel because it is only a substitute for plastic.
   E) the demand curve for steel to shift to the left.

1. A situation in which the unregulated competitive market outcome is inefficient because prices fail to provide proper signals to buyers and sellers is known as:
   A) an imperfectly competitive market.
   B) a market failure.
   C) a deadweight loss.
   D) a disequilibrium.

2. Although the U. S. airline industry has only a relatively small number of sellers, the market is nevertheless highly competitive. The reason is that:
   A) the number of buyers is very large.
   B) due to fierce competition, no firm has significant control over prices.
   C) due to fierce competition, no firm has significant control over the quantity supplied.
   D) most airline routes are served by relatively many sellers.

3. Since last year, the price of gold has risen from $1100 to $1420. What annual inflation rate would leave the real price of gold unchanged over the last twelve months?
   A) Approximately 29%
   B) 40%
   C) Approximately 71%
   D) 320%
   E) none of the above

6. The demand for books is: $Qd = 120 - P$
   The supply of books is: $Q_S = 5P$

   What is the equilibrium quantity of books sold?
   A) 25
   B) 50
   C) 75
   D) 100
   E) none of the above

7. Suppose the observed annual quantity of steel exchanged in the European market is 30 million metric tons, and the observed market price is 90 euros per ton. If the linear demand function for steel takes the form $Q = a - 0.9P$, what is an appropriate value for the intercept coefficient a?
   A) $a = -51$
   B) $a = 51$
   C) $a = 111$
   D) $a = -111$

8. When the government controls the price of a product, causing the market price to be below the free market equilibrium price,
   A) some consumers gain from the price controls and other consumers lose.
   B) all producers gain from the price controls.
   C) both producers and consumers gain.
   D) all consumers are better-off.

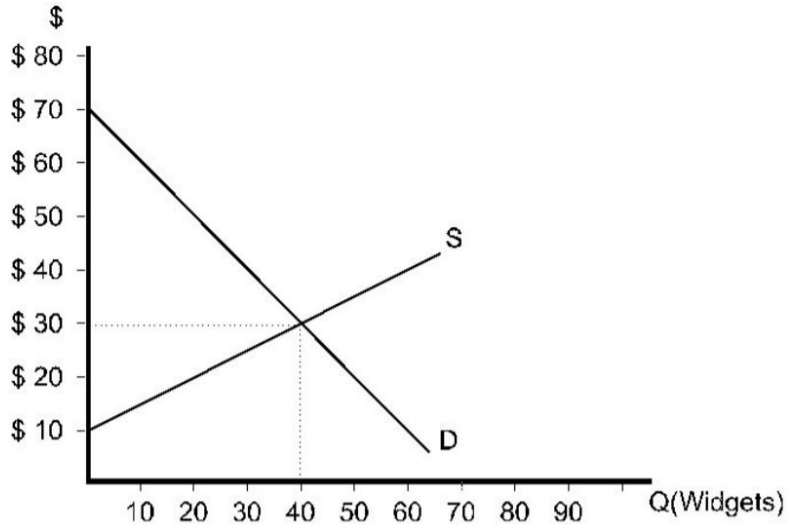


Figure 1

9. Refer to Figure 1. If the market is in equilibrium, the producer surplus earned by the lowest cost seller is _____.
   A) $5.00
   B) $10.00
   C) $15.00
   D) $20.00
   E) $40.00

10. Refer to Figure 1. If the market is in equilibrium, total consumer surplus is
   A) $30.
   B) $70.
   C) $400.
   D) $800.
   E) $1200.

11. Refer to Figure 1. Suppose the market is currently in equilibrium. If the government establishes a price ceiling of $20, producer surplus will
   A) fall by $200.
   B) fall by $300.
   C) remain the same.
   D) rise by $200.
   E) rise by $300.

Ch.3

2) Which of the following is not true about price floors?
   a) Producers will often respond to a price floor by cutting production to the point at which price equals marginal cost
   b) Consumer surplus is always lower than it would be in the competitive equilibrium
   c) The total producer surplus depends on how producers respond to the price floor in determining their output level
   d) Producer surplus could be negative as a result of a price floor

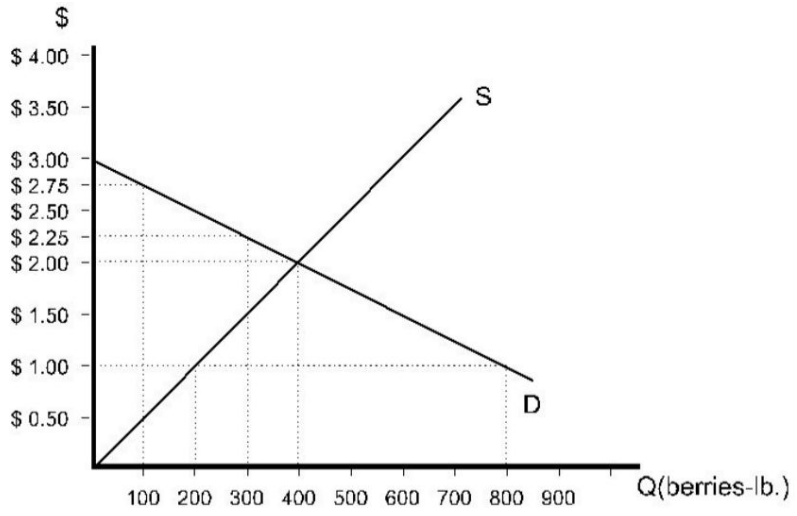


Figure 2

12. Refer to Figure 2. If the government establishes a price floor of $2.50, how many pounds of berries will be sold?
    A) 200
    B) 300
    C) 400
    D) 600
    E) 800

13. Refer to Figure 2. If the government establishes a price floor of $2.50 and farmers grow only the amount of berries that will be sold, the resulting deadweight loss will be
    A) $1.50.
    B) 200 pounds of berries.
    C) $150.
    D) $250.
    E) $300.

14. A minimum wage policy induces an:
    A) excess demand for labor.
    B) excess supply of labor.
    C) efficient market outcome.
    D) elastic labor supply response.

27. Which of the following would cause a leftward shift in the demand for gasoline?
i) A large decrease in price of public transportation
ii) A large increase in the price of automobiles
iii) A large increase in the costs of producing gasoline

a. i) and ii) only
b. i) and iii) only
c. ii) and iii) only

30. If the cross price elasticity is negative it means the products are
a) normal
b) inferior
c) complements
d) substitutes

19. In Canada, the price elasticity of demand for coffee is -0.24, the price elasticity of supply for coffee is 0.36, income elasticity of demand for coffee is 0.8, the equilibrium quantity is 37.95 metric tons, equilibrium price is $207 per metric ton, and the average household income is $58,000. The demand equation for coffee in Canada is :

a) Qd = 42.966 – 0.044P
b) Qd = 45.012 – 0.044P
c) Qd = 47.058 – 0.044P
d) Qd = 49.274 – 0.044P

$-0.24 = -b \times \frac{207}{37.95}$

$-b = 0.044$

$Q_d = a - 0.044P$

$37.95 = a - 0.044(207)$

$47.058 = a$

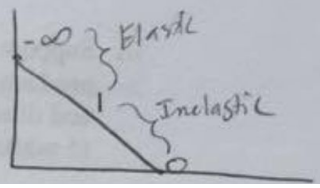
No opinion negative = opinion

27) Which of the following is a positive statement?

a. Smoking should be restricted on all airline flights.
b. The minimum wage should not be increased because this would increase unemployment.
c. A fundamental assumption of the economic theory of consumer behaviour is that consumers always prefer having more of any good to having less of it.
d. All automobile passengers should be required to wear seatbelts in order to protect them against injury.

29. Along any downward sloping straight-line demand curve:

a. Both the price elasticity and slope vary.
b. The price elasticity varies, but the slope is constant.
c. The slope varies, but the price elasticity is constant.
d. Both the price elasticity and slope are constant.



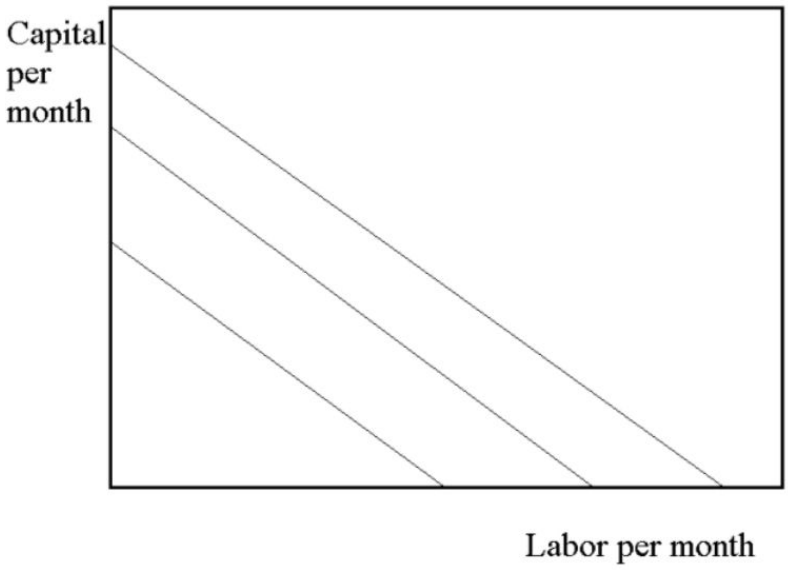
60) If the isoquants are straight lines, then
A) inputs have fixed costs at all use rates.
B) the marginal rate of technical substitution of inputs is constant.
C) only one combination of inputs is possible.
D) there are constant returns to scale.

Answer: B
Diff: 1
Section: 6.3

61) A production function in which the inputs are perfectly substitutable would have isoquants that are
A) convex to the origin.
B) L–shaped.
C) linear.
D) concave to the origin.

Answer: C
Diff: 1
Section: 6.3

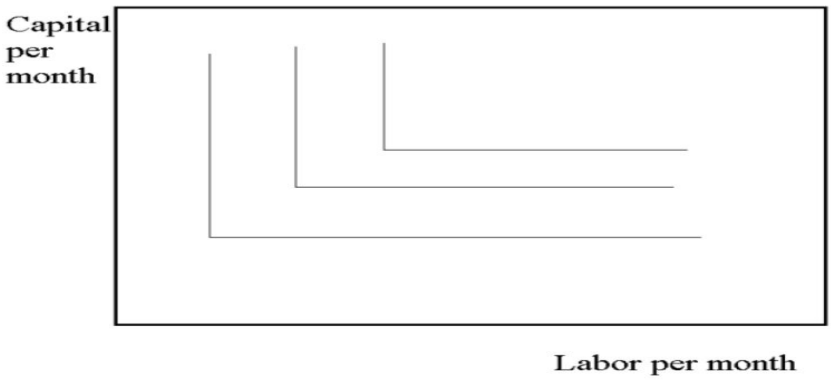
62) An examination of the production isoquants in the diagram below reveals that:



A) capital and labor must be used in fixed proportions.
B) capital and labor are perfectly substitutable.
C) except at the corners of the isoquants the MRTS is constant.
D) Both B and C are correct.
E) none of the above

Answer: D

63) An examination of the production isoquants in the diagram below reveals that:



A) capital and labor will be used in fixed proportions.
B) Capital and labor are perfectly substitutable.
C) the MRTS is constant.
D) Both B and C are correct.
E) none of the above

Answer: A
Diff: 1
Section: 6.3

56) Which of these measures the responsiveness of the quantity of one good demanded to an increase in the price of another good?

A) price elasticity.
B) income elasticity.
C) cross price elasticity.
D) cross substitution elasticity.

Answer: C
Diff: 1
Section: 2.4

57) The cross price elasticity between a pair of complementary goods will be

A) positive.
B) negative.
C) zero.
D) positive or zero depending upon the strength of the relationship.

Answer: B