QUESTIONS for written exam in microeconomics. Only one answer is correct.

CONSUMPTION THEORY - first part (Varian, chapters 2-7)

1. Antonio buys only two goods, cigarettes and bananas. The cost of 1 packet of cigarettes is € 4 and the cost of a pound of bananas is € 3. Spending his weekly income only in bananas, Antonio can buy 12 pounds of bananas per week. How many packets of cigarettes (per week) could he buy, spending his income to buy only cigarettes?
a) 36
b) 48
c) 9
d) 16
e) none of the other answers is correct.

2. Let p_x and p_y be the prices of goods x and y, and R be consumer's income. The intercept of the budget line with the horizontal axis of the plane (x, y) represents:
a) the quantity of good x that the consumer can buy when R = 0
b) the quantity of good y that the consumer can buy when $p_y = 0$
c) the maximum amount of good x that the consumer can buy with income R
d) the maximum amount of good x that the consumer is willing to buy
e) none of the other answers is correct

3. Let p_x and p_y be the prices of goods x and y, and R consumer's income. The budget line shifts parallel towards the origin if there is:
a) 5% increase of p_x and p_y
b) 5% increase of p_x and 10% increase of p_y
c) 5% increase of both prices and income
d) a change of consumer's preferences
e) none of the other answers is correct

4. Assume oranges contain 120 calories per pound, and spinaches 40 calories per pound. If consumer's satisfaction increases with the number of calories, and depends only on this, identify which of the following equations describes an indifference curve of the consumer.
A = pounds of oranges, S = pounds of spinaches, K = constant
(Hint: utility = calories)
a) 4A + 3S = 12
b) 4A + 3S = K
c) 3A + S = K
d) A + 3S = K
e) none of the other answers is correct.

5. Carlo has strictly convex preferences for goods 1 and 2. For him baskets (2, 10) and (10, 2) are indifferent. Which of the following statements is necessarily true:
a) (5, 7) strictly preferred to (7, 5)
b) (7.5) strictly preferred to (5, 7)
c) (11: 1) strictly preferred to (2, 10)
d) (2, 10) strictly preferred to (11, 1)
e) none of the other answers is correct

6. Marco would like to offer maximum comfort to his two sons, tirelessly playing tennis matches one against the other. He rents (hourly) for his sons the best tennis court of the city and the best racquets on the market. If K is a constant, the indifference curves of Marco for hours-racket and hours-court are:
a) Min (2R, C) = K
b) Min (R, 2C) = K
c) Min (R, C) = K
d) 2R + C = K
e) none of the other answers is correct.

7. The intersection of two indifference curves is impossible due to:
a) the non satiation hypothesis
b) the decreasing marginal utility hypothesis
c) the transitivity of preferences
d) the monotonicity of preferences
e) none of the other answers is correct

8. Completeness of consumer preferences means that:
a) the consumer is never indifferent between two baskets of goods
b) all consumers have preferences
c) the consumer always knows how to compare two baskets of goods
d) the consumer always prefers more to the less
e) none of the other answers is correct

9. What should a consumer do with her endowment of goods x and y, if the marginal rate of substitution (MRS) associated with that endowment is greater, in absolute value, than the relative price p_x / p_y?
a) reduce the consumption of y and increase that of x
b) reduce the consumption of x and increase that of y
c) do not modify the composition of her consumption basket
d) modify the price of good y
e) none of the other answers is correct

10. The marginal rate of substitution (in absolute value) decreases as x increases (good x is measured on the horizontal axis of the consumption plane)
a) because the slope of the budget line is decreasing
b) because preferences are concave
c) because preferences are reflexive
d) because preferences are monotonic
e) none of the other answers is correct

11. Consumer's preferences are monotonic if:
a) all goods are consumed in fixed proportions
b) all goods are perfect substitutes
c) more is always preferred to less
d) the marginal rate of substitution is decreasing
e) none of the other answers is correct.

12. The relation "is preferred to", defined on baskets of goods, is an example of a binary relation. The binary relation "is more heavy than", defined on the set of human beings, is:
a) neither transitive nor complete, nor reflexive
b) reflexive, transitive and complete
c) reflexive and transitive, but not complete
d) transitive, but not complete, and not reflexive
e) transitive and complete, but not reflexive

13. In consumer theory, assuming strict convexity of preferences, what is the relation between optimal choice X* and the tangency of the budget line with the indifference curve through X*?
a) tangency is always necessary and sufficient for optimal choice, no matter whether interior or corner optima are involved.
b) tangency is necessary but not sufficient for optimal choice
c) tangency is sufficient but not necessary for optimal choice
d) tangency is sufficient but not necessary for optimal choice, only if corner optima are excluded
e) none of the other statements is correct

14. Gina's utility function is $U(x, y) = y + 5x^{1/2}$. Gina consumes a unit of x and two units of y. If her consumption of x becomes zero, how many units of y must she consume to be as well off as before?

a) 14
b) 9
c) 11
d) 7
e) none of the other answers is correct.

15. Paola's utility function is $U(x, y) = x + 12y - 2y^2$. Her income is 25. If the price of x is 1 and the price of y is 8, how many units of x will Paola buy?
a) 15
b) 12
c) 17
d) 12,5
e) none of the other answers is correct.

16. Which of the following utility functions are monotonic increasing transformations of $U(x, y) = xy$?
(i) $U(x, y) = 1000xy + 2000$; (ii) $U(x, y) = xy(1 - xy)$; (iii) $U(x, y) = -1/(10 + xy)$; (iv) $U(x, y) = x/y$; (v) $U(x, y) = -xy$.
a) none
b) i and ii
c) i, ii, iii
d) i, iii
e) none of the other answers is correct

17. A consumer utility function is min {3x, 2y}; the price of x is 5 and the price of y is 6. If he consumes 4 units of x, what is consumer' income?
a) 56
b) 18
c) 70
d) 24
e) none of the other answers is correct

18. For consumer A the goods x and y are perfect complements in the proportion of 2 units of x and 3 units of y (for instance, A always consumes 1 coffee with 1.5 teaspoons of sugar). At prices [5, 6] how many units of x will she consume if her income is 56?
a) it's impossible to answer, because the utility function is not known
b) 2
c) 4
d) 5
e) none of the other answers is correct

19. Rocco's utility function represents regular preferences. He consumes only apples and bananas spending an income m. There is an increase in the price of apples and simultaneously an increase in m so that, after the change, Rocco's utility is unchanged. After the change Rocco consumes:
a) more bananas and fewer apples;
b) fewer bananas and more apples;
c) more of both goods;
d) less of both goods;
e) none of the other answers is correct.

20. If there are two goods, and consumer's income and the price of good 1 double, while the price of good 2 is unchanged, the consumer:
a) increases her demand for good 1 only if good 1 is a Giffen good
b) decreases the demand for good 2 only if good 2 is a Giffen good
c) increases the demand for good 2 only if good 2 is an inferior good
d) decreases the demand for good 2 only if good 2 is an inferior good
e) none of the other answers is correct.

21. A can consume two commodities, but one of them is actually a "bad", the other a "good" . A's indifference curves are:
a) similar to what they are in the case of two "goods"
b) positively sloping, with utility growing with a larger quantity of the "good"
c) positively sloping, with utility growing with a larger quantity of the 'bad'
d) downward sloping, with utility growing with a larger quantity of the 'bad'
e) none of the other answers is correct

22. For a consumer each cup of coffee is a perfect substitute for two cups of tea. If a cup of coffee costs $ 7 and a cup of tea costs $ 4, which is her demand for cups of tea if her income is $ 56?
a) 8 cups of tea
b) 16 cups of tea
c) any quantity between 0 and 16
d) 0 cups of tea
e) none of the other answers is correct

23. Luca's utility function is $U(x, y)= xy^2$ and Simone's utility function is $U(x, y) = x + 2y$. If, in market equilibrium, both consume positive quantities of both goods, the x/y consumption ratio must be:
a) 1/2 for Luca, 1 for Simone
b) 3/4 for Simone
c) 1/4 for both
d) 1 for Luca, undetermined for Simone
e) none of the other answers is correct

24. Which of the following statements is correct when applied to Slutsky's income and substitution effects (given the monetary income):
a) the first is always positive, the second always negative
b) they can be both positive and negative
c) the second is always negative, first can be positive or negative
d) the first is always negative, the second can be positive or negative
e) none of the other answers is correct

25. At the prices [1, 5] Emilio chooses the basket (1, 6). At prices [3, 1] he chooses the basket (7,2).
a) Emilio's choices violate the Weak Axiom of Revealed Preference (WARP)
b) Emilio has kinked preferences
c) Emilio's choices do not violate the Weak Axiom of Revealed Preference (WARP)
d) the baskets are indifferent
e) none of the other answers is correct

26. A consumer with monotonic preferences makes the following choices: at prices [1, 5] she chooses the basket (11, 5); at prices [4, 1] she chooses the basket (7,3).
a) basket (11,5) is revealed preferred to basket (7,3)
b) basket (7, 3) is revealed preferred to basket (11,5)
c) consumer's behavior violates WARP
d) It is arbitrary to make statements on consumer preferences, because income is unknown
e) none of the other answers is correct.

27 *. A's utility function is $U(x, y) = xy$, B's utility function is $(x, y) = x + y$. C's utility function is $U(x, y) = \min \{x, y\}$. Ruling out corner solutions (all consumers choose positive amounts of each good), we can say that the ratio x / y:
a) is indeterminate for each consumer, because we don't know prices
b) is 1 for consumer C only
c) is 1 for A, B and C
d) is 1 for A and C
e) none of the other answers is correct.

28 *. Anna consumes only goods 1 and 2. When the price of good 1 increases, while the price of good 2 and income are unchanged, she buys less of both goods, 1 and 2. From this information we can certainly conclude that

a) good 1 is a normal good
b) good 2 is a normal good
c) good 1 is an inferior good
d) good 2 is an inferior good
e) she prefers good 1 to good 2

ANSWERS

1. C
2. C
3. A
4. C
5. D
6. B
7. C
8. C
9. A
10. E
11. C
12. D
13. C
14. D
15. C
16. D
17. A
18. C
19. A
20. B
21. B
22. D
23. D
24. C
25. A
26. A
27. Proceed as in the case of Question 21, noting that the price should be the same for all subjects and that the positive quantity consumption of both goods by B is a precise indication of what is the relationship between prices.
28. The higher price of good 1, with unchanged money income, implies a lower purchasing power. Slutsky's equation does not allow to determine whether good 1 is normal or inferior. Reasoning about the sign of dx_2/dp_1 , and noting that the substitution effect with respect to a change in the price of the other good is always positive, we must conclude that good 2 is normal. If it was inferior, both substitution and income effects would determine a greater demand for good 2, contrary to the hypothesis.

reservation price and opportunity cost: choosing to attend concerts (Varian, Ch. 6 and 14)

The English band Portishead, announces that two concerts of their tour in Europe will take place in Italy. Mario is an old fan of the band, and gathers information on the ticket price for the first concert to be held in Florence, where he lives. The fan has a quasi-linear utility function for Portishead's concerts (T) and other goods (C): $U(T, C) = 50T - 10T^2 + C$. The prices of C is 1 and the fan's weekly income is €100.

A) What is fan's reservation price for the first concert?
Concert T is a discrete good, so we compute the reservation price for T = 1 simply as the maximum amount of money the person is willing to spend to "consume T = 1", or the amount that leaves him indifferent between T = 0 and T = 1. Setting $U(0, 100) = U(1, 100 - r_1)$, that is, $100 = 50 - 10 + (100 - r_1)$, we obtain $r_1 = 40$.

B) After checking that the ticket price is €32, will he decide to attend the concert or not? If he decides to go, what is the benefit he gets ?
An agent buys an additional unit of a good if r > p. Since the reservation price is greater than the price of the ticket, Mario decides to buy the ticket and attends the concert.
This gives him a net benefit of 8 Euro. (Notice: each ticket price up to 40 is compatible with going to the concert, but the benefit decreases as the price increases, it vanishes at p = 40, and it becomes negative at still higher prices (in which case the fan does not buy the ticket)

Before buying the ticket for the first concert, the Portishead fan discovers that some friends have already arranged to follow also the second concert, scheduled the next day in Milan. His friends say they will be glad to offer him a ride by car, and since they would go anyway he would not bear any travel cost.

C) What is Mario's reservation price for the second concert? Since the price is unchanged, will he decide to attend the second concert too? Does his choice depend on his money budget?
Repeating the previous reasoning, we compute the maximum ticket price he is prepared to pay to attend also the second Portishead concert. This is his reservation price r_2, namely, the ticket price leaving the fan indifferent between T = 1 and T = 2. Hence, $U(1, 100 - r_2) = U(2, 100 - 2r_2)$. Computation yields $50 - 10 + 100 - r_2 = 100 - 40 + 100 - 2r_2$, that is, $r_2 = 20$. The reservation price is now lower than the ticket price, and the fan decides **he is not going** with his friends. This choice is independent of his weekly income (that would be sufficient to buy both tickets, anyway), because his utility function represents quasi-linear preferences for T and C.

Suppose that before buying the ticket of the first Portishead concert, Mario envisaged the possibility to attend an alternative free concert, also played in Florence, on the same night. The band is 'Vibrations', and their genre, Italian rock recalling the '70s, still has a certain appeal on Mario.

D) What is the opportunity cost of going to the 'Vibrations' concert? 40, 32, 8, 0?
Remind that *opportunity cost* means the "implicit" cost of a choice, measured in terms of the benefit you give up, in forgoing the best alternative possible. So the opportunity cost of attending the 'Vibrations' concert, is not the ticket price, that is, zero, but the foregone benefit he would get in attending the Florence Portishead concert. Thus, the opportunity cost is 8.

Long run profit and firm market value. What is worth a taxi license? (Varian, Ch. 11 and 22)

A small Tuscan town has a free market of public transport services (taxi): providing minimum safety standards, anyone can start up a taxi service. Assuming for simplicity that all trips are of equal length, the marginal and average cost of a trip is € 5, while the daily trip capacity is 20. There are no fixed costs (you may think that the cars are leased and the leasing cost is counted along with the other variable costs). The demand function for the good "Taxi ride" is D (p) = 1200 - 20p.

A) If the industry is perfectly competitive, what is the long-run equilibrium price of a "Taxi ride"? How many taxis will travel every day in this town? What is the daily profit of a taxi driver?
The long-run equilibrium price of a competitive industry is the outcome of an entry process, and is the lowest price below which firms would not be prepared to stay in the market. This is the minimum average cost, that in the present case is equal to the constant marginal cost. So p = 5. At p = 5, total demand is D = 1100, which means that 55 taxis are needed. Obviously, the free entry of taxi drivers cancels any profit over and above the pure remuneration of factors costs.

After a heated debate, the City Council of this town decides to regulate the taxi service issuing a number of public transport licenses. 55 licenses are assigned, those necessary to maintain the current market equilibrium. Since drivers do not make any profit, no payment is required for licenses, which are simply assigned by competition to the best drivers. New additional licenses may be issued in the future, through a resolution of the town council, according to the possible market changes.

B) One year after, the demand for "taxi rides" is D(p) = 1220 - 20p. What is the new market equilibrium price? What is the daily and annual profit of a taxi driver, assuming the taxi service is supplied 300 days in 1 year? At a 3% interest rate, what is the market price of a Taxi license, if the number of licenses and the demand function D(p) are unchanged?
If the number of taxis is 55, and daily trips 20, total daily-trip supply is 1100. A shift upwards of demand curve brings the new equilibrium price to p = 6. In fact, at p = 6, 1220 - 20p = 1100. Taxi drivers make now a profit of €1 per ride, so € 20 per day, and €6000 per year. Since the taxi service earns a net profit, its value may defined as the present value of a financial asset yielding €6000 each future year. At an interest rate of 3% (it would be lower in 2016) the license value is:
€6000 / 0.03 = €200.000 .

Since market conditions have changed, the city council decides to issue new licenses, to bring back the price of a "taxi ride" to the value p = 5, preceding the variation in demand.

C) How many new taxi licenses are required? What is the value of a license, after release of new licenses? What is the maximum amount a license holder is willing to pay, to avoid the issue of new licenses? What is the maximum amount license holders are willing to pay in the aggregate?
To bring back the price to p = 5, the required supply of taxi rides is S = D(5), where *D(p) is now D(p) = 1220 - 20p*. Therefore S = 1120, and 1 additional license has to be issued. Issuing the new license would cancel profits and would bring down to zero the value of a license. *If there is a taxi license market*, every taxi driver will be willing to pay up to 120.000 euros to avoid the emission of the license. The overall maximum willingness to pay to prevent the issue of 1 extra license is therefore 55 * 120.000 .

Slutsky's equation: CHANGING TOWN (Varian chap. 8 and 14)

Bob is an employee of a multinational company, and lives in the center of a small Italian town with a monthly salary of €3000; he consumes two goods, food and accomodation. The price of food (good 1) is 20 €, the price of accomodation (good 2) is €500. His utility function is $U = x_1^{1/3} x_2^{2/3}$

A) Determine Bob's optimal consumption bundle
Noting that the utility function is Cobb-Douglas, $x_1 = 1/3\ [3000/20] = 50$; $x_2 = 2/3[3000/500] = 4$

The company informs Bob that his job is going to be moved to the subsidiary in a big town, without any change in salary. In this new town the house rent is higher, in fact the prices of the two goods are [20.1000].

B) What is Bob's new optimal consumption bundle? What is the amount of money that would be necessary to buy its previous consumption bundle at the new prices?
At prices *[20.1000]* and steady money income, the optimal consumption bundle is (50,2). As a result of the transfer to the new town, he can only afford a smaller apartment.
The income needed to buy the old bundle (5,.4) at the new prices [20,1000] is € 5000.
(Because the additional income of €2000 would allow him to compensate for the change in prices, the income €5000 is called *compensated income*, and the corresponding optimal demand is called *compensated demand*).

C) How large is the substitution effect? how large the income effect?
Since in previous answers we computed the initial and final consumption bundle (at income €3000) , we now compute the optimal bundle at the new price, and at he compensated income m' = 5000:
$x_2 = 2/3\ [5000/1000] = 10/3$
So conclude:
overall change in demand: $2 - 4 = -2$
change due to substitution effect: $(10 / 3) - 4 = -2/3$
change due to income effect: $2 - (10 / 3) = -4/3$

D) What is the amount of money the employee should ask to the company to refund him for the transfer?
Clearly the employee should ask for a salary increase of € 2000.
Indeed €2000 is the salary increase allowing him to consume the initial bundle at final prices. This sum is called COMPENSATED INCOME CHANGE

Questions on consumer choice, income and substitution effect (Varian, chapters: 8, 9)

1.
A consumer has the following utility function:
$u(x, y) = xy^2$. The prices of the two goods are 3 and 2, respectively, and income results from a physical allocation (100,100). Determine the net demand of good y.
Solution: Income m = 300 + 200 = 500
The preferences are represented by $v(x, y) = x^{1/3} y^{2/3}$. v (x, y) is obtained by monotonic positive transformation of u(x, y).
Gross demand for y = (2/3) m (1/2) = 500/3
Net demand for y = 500/3 - 100 = 200/3

2.
A consumer has endowment $\omega 1 = 10$ and $\omega 2 = 10$ of two consumer goods, 1 and 2. His preferences are represented by the utility function $u = \min(x_1, 2x_2)$. At prices $p_1 = 2$ and $p_2 = 1$ his net demand for good 1 is:

solution:
income $m = 10p_1+10p_2 = 30$
the consumer wants to consume: $x_1 = 2x_2$.
$m = 30 = x_1 p_1 + x_2p_2 = 2x_2 p_1 + x_2p_2. = x_2 (2p_1 + p_2) = 5x_2$
$x_2 = 6$
$x_1 = 12$
net demand for good $1 = x_1 - \omega_1 = 2$

3.
A consumer has endowment $\omega_1 = 20$ and $\omega_2 = 10$ of two consumer goods, 1 and 2. Her preferences are represented by the utility function $u = x_1x_2$. At prices $p_1 = 1$ and $p_2 = 1$, what is her net demand for good 2?

Solution:
$m = 20p_1+10p_2 =30$
preferences represented by $v(x_1, x_2) = x_1^{1/2} x_2^{1/2}$
$x_2 = (1/2)\, m / p_2 = 15$
net demand for good $2 = x_2 - \omega_2 = 5$

4.
A consumer has the utility function u (x, y) = min (x, 2y). His income is 20.
The prices of goods are (1, 2), respectively. If the price of y rises to 4 (with the price of x fixed at 1), what can you say about Slutsky's income effect on good y caused by the price change?

Solution:
The consumer wants to consume goods in the RATIO $x / y = 2$ therefore $x = 2y$.
From the budget constraint: $m = 20 = x\, p_x + y\, p_y$
At the initial prices you have: $20 = x + 2y = 4y$
Demand $y(p_y, m) = 5$ = demand for y, at the initial price $p_y = 2$, and income m.
At the new price $p'_y = 4$, we have: $20 = x + 4y = 6y$
Demand for y $(p'_y, m) = 10/3$ demand for y, at new price p'_y, and the 'true' income m = 20.
Hence $\Delta y = y(p'_y, m) - y(p_y, m) = (10/3) - 5 = -5/3$

Because $\Delta p_y = 2$, to buy the initial optimal bundle (x = 10, y = 5) the consumer must be given a virtual increase in income $m' - m = \Delta m = y\, \Delta p_y = 10$.

The compensated virtual income is m' = m + Δm = 30
With m' = 30, the budget constraint at prices $p_x = 1$, $p'_y = 4$ would be: 30 = x + 4y = 6y, hence:
$y(p'_y, m') = 5$ = demand for y at price p'_y , and virtual income m'.
The substitution effect for y is : $y(p'_y, m') - y(p_y, m) = 0$
The income effect for y is : $y(p'_y, m) - y(p'_y, m') = (10/3) - 5 = -5/3 = \Delta y$

5.
A consumer has the utility function: u(x, y) = x + 2y. His income is 20. Goods prices are (1, 1), respectively. If the price p_y becomes $p_y = 3$ (with p_x fixed at $p_x = 1$), what can we say about the substitution effect concerning good y?

Pure exchange economy: exercise with solution

An economy consists of two goods, x, y, and two consumers A, B, taking market prices as given. A and B have utility function $u_A = x_A^{1/3} y_A^{2/3}$, $u_B^{2/3} y_B^{1/3}$, respectively. The former has the endowment (1, 2) the latter (2, 1). If $p_x=1$, $p_y=2$, what is the aggregate excess demand for good x?

Solution:
A's Income: 1 + 4 = 5
B's Income: 2 + 2 = 4
aggregate supply of good x = 3
aggregate supply of good y = 3
demand x (A) = (1/3) (5) / 1 = 5/3
demand y (A) = (2/3) (5) / 2 = 5/3
demand x (B) = (2/3) (4) / 1 = 8/3
demand y (B) = (1/3) (4) / 2 = 2/3
aggregate excess demand for good x = (5/3) + (8/3) − 3 = 4/3

Pure exchange economy (Varian chapter 31)

8. Two agents A and B have utility functions in terms of goods x and y, $u^A(x, y) = 40x^{1/2} + y$ and $u^B(x, y) = 4x + y$. In a Pareto efficient allocation in which both subjects consume a positive quantity of both goods, it is the case that:
a) B consumes 25 units of x
b) A consumes 5 units of y
c) A consumes 15 units of y
d) A consumes 25 units of x
e) It's impossible to answer, without indication of endowments and prices.

9. The first welfare theorem of economics states that:
a) any competitive equilibrium allocation is Pareto-efficient, if there are no externalities.
b) any Pareto-efficient allocation of the economy is the competitive equilibrium allocation, corresponding to an appropriate allocation of initial endowments
c) Walras' law applies only in the equilibrium allocation of a competitive economy
d) in a competitive equilibrium allocation, the excess demand for each good is zero
e) none of the other answers is correct.

10. A competitive pure exchange economy consists of two consumers A and B, with endowments $(\acute{\omega}^A_1, \acute{\omega}^A_2)$, $(\acute{\omega}^B_1, \acute{\omega}^B_2)$ of two goods 1 and 2. If at prices $p_1 = 1$, $p_2 = 2$ the aggregate excess demand for good 2, z_2, is +5, then:
a) the aggregate excess demand for good 1 is − 5
b) the value of the aggregate excess demand for good 1, p_1z_1 , is − 10
c) the sum of the two goods aggregate excess demands, $z_1 + z_2$, is zero
d) the aggregate excess demand for good 1, z_1, may be zero
e) none of the other answers is correct.

11. "Walras' law":
a) holds only in a perfect competitive equilibrium of the economy
b) holds only if the market for at least one good is in equilibrium
c) states that the value of the aggregate excess demand for each good is zero
d) states that at prices p_1 , p_2, the value of the sum of the aggregate excess demands, $p_1z_1 + p_2z_2$, is zero
e) none of the other answers is correct.

12. Consider a pure exchange economy with two goods, x and y, and two agents A and B, and with the following features: utility functions: $U^A=x^Ay^A$, $U^B=x^By^B$; endowments: $\Omega^A = (1, 4)$, $\Omega^B = (4, 1)$. If the demand vector is X = (x, y), a competitive equilibrium of that economy is described by:
a) $p_x = 1$, $p_y=1$, $X^A = (5/2, 5/2)$, $X^B = (5/2, 5/2)$
b) $p_x = 2$, $p_y=1$, $X^A = (5/2, 5/2)$, $X^B = (5/2, 5/2)$
c) $p_x = 1$, $p_y=2$, $X^A = (1, 4)$, $X^B = (4, 1)$
d) $p_x = 1$, $p_y=1$, $X^A = (1, 4)$, $X^B = (4, 1)$
e) none of the other answers is correct

13. Piero and Duccio are the only agents of a competitive economy with two goods, x and y. Piero's utility function is $U(x, y) = xy^2$. Duccio's utility function is $U(x, y) = \min(x, y)$. Piero has an endowment of 3 units of x and 4 units of y. Duccio has an endowment of 7 units of x and 6 units of y. It follows that in competitive equilibrium:
a) both consume 5 units of each good;
b) Duccio consumes 6 units of each good, because the seventh unit of its endowment of good 1 does not give him any additional benefit;
c) Duccio must consume equal amounts of the two goods, so the price of good 1 must be equal to the price of good 2;
d) the prices of the two goods cannot be the same, as Piero and Duccio do not have the same endowments;
e) none of the other answers is correct.

14. Consider the pure exchange economy with two goods, x and y, and two agents A and B, with utility functions $U_A = x_A + y_A$, $U_B = x_B\, y_B$ and endowments $\Omega^A = (1, 1/2)$, $\Omega^B = (0, 1/2)$
If both of them consume positive quantities of both goods, and X = (x, y) indicates the demand basket, then a competitive equilibrium is:
a) $p_x = 1$, $p_y = 1$, $X^A = (1, 1/2)$, $X^B = (1/2, 1/2)$
b) $p_x = 1/2$, $p_y = 1$, $X^A = (1/2, 3/4)$, $X^B = (1/2, 1/4)$
c) $p_x = 1$, $p_y = 1$, $X^A = (1/2, 1/2)$, $X^B = (1/2, 1/4)$
d) $p_x = 1/2$, $p_y = 1$, $X^A = (3/4, 3/4)$, $X^B = (1/4, 1/4)$
e) none of the other answers is correct

15. In a pure exchange economy there are 1000 consumers of type A, and 1000 of type B, each having the same allocation (1, 1) of the two existing goods, but a different utility function, $U_A(x, y) = x^{1/2}y^{1/2}$, $U_B(x, y) = xy^2$. Determine the equilibrium price ratio p_x/p_y.
a) it cannot be determined
b) 1/2
c) 6
d) 5/7
e) none of the other answers is correct.

ANSWERS:
8. D
9. A
10. B
11. D
12. A
13. E
14. E
15. D