INTRODUCTION TO MICROECONOMICS  
University of Navarra

FINAL EXAM  
January 24, 2006  
Time available: 3 hours 30 minutes

PART 1: Concepts

Define the following terms (you must define at least 15 of these concepts correctly, or else the second part of the exam will not be graded):

1. Economies of scale:

2. Perfectly competitive market:

3. Efficiency:

4. Consumer’s optimal choice:

5. Supply curve:

6. Income effect:

7. Perfectly inelastic demand:
8. Giffen good:

9. Externality:

10. Opportunity cost:

11. Normal good:

12. Consumer surplus:

13. Marginal rate of substitution:

14. Diminishing marginal product:

15. Deadweight loss:

16. The production possibilities frontier:

17. Cross price elasticity of demand:

18. Monopsony:

19. Substitute goods:

20. Law of demand:
PART 2

Please answer the following questions briefly and concisely on the exam paper. Scratch paper is not allowed. You may write on the back of the exam pages if you need extra space. It is a good idea to use graphs in your answers.

Theoretical questions (6.5 points)

Problem 1. Income taxes. (2 points)

Consider an individual who chooses between two goods x and y, in order to maximize his utility U(x,y). This consumer has income R, and the prices of the goods are p_x and p_y.

a) Draw a graph illustrating the consumer’s optimal choice, making the usual assumptions we have made in class about his preferences over the two goods.

Suppose that in the next year, the consumer has the same income R, but now he is required to pay taxes on his income. The tax he must pay is T = t·R.

b) How would this tax affect the consumer’s budget constraint? Show how the change in the budget constraint affects the consumer’s optimal choice.

c) Explain, in reference to your graph, what you are assuming about the two goods x and y. (That is, are they complements, substitutes, normal goods, inferior goods, ... ???)

d) What effect does the consumer experience in this example: an income effect, or a substitution effect? Explain briefly.
Problem 2. Cost minimization. (2 points)

Consider a firm with the following total cost function in the short run:

\[ CT = A + b \cdot Q^2, \]

where \( A > 0, b > 0 \) are constants and \( Q \) is the quantity produced.

a) In one graph, draw the curves representing fixed costs (FC), variable costs (VC), and total costs (TC), and comment briefly on the form of each curve.

b) Calculate average fixed costs AFC, average variable costs AVC, average total costs ATC, and marginal costs MC. Draw them in one graph. Where in the graph does the firm minimize its average total cost? Comment briefly.
Suppose another firm’s total cost function is instead

$$CT = A + b \cdot Q.$$ 

c) In one graph, draw the curves FC, VC, and TC.
In a second graph, draw the curves AFC, AVC, ATC, and MC. Comment briefly.

d) In this case, is it possible for a firm to minimize average total cost? Explain.

e) In the software industry (unlike traditional heavy industries) producing extra copies of programs is very cheap. Which of the two previous cost functions do you think would better represent the cost of producing extra copies of Microsoft Windows? Can this example help us understand why Microsoft is such a big firm?
Problem 3. The labor market. (2.5 points)

Javier has just finished his degree, and he is sending out his CV to potential employers. His utility at a point in time depends on his consumption, c, and on the amount of free time, l, he has to spend on his hobby, jogging. Suppose his utility function is represented by \( U(c,l) = c \cdot l \). For each hour he works per day (out of a total of 24 hours, so his work is \( h = 24 - l \)) he receives the wage \( w \). Javier does not save, so he spends all his income on consumption. Let’s assume that the price of consumption is \( p = 1 \).

a) Graph Javier’s optimal choice, and calculate his labor supply.

b) Suppose that in Javier’s city there is a total population of 300 people, who all have exactly the same preferences as Javier. Calculate the total labor supply in this market.
Suppose there is just one firm in Javier’s city, which has the labor demand function, \( w = 120 \cdot L^{(-1/2)} \).

c) Calculate labor market equilibrium in this city. Graph labor supply and labor demand.

d) Suppose the city government tries to promote workers’ interests by imposing a minimum wage higher than the market equilibrium wage. Show what happens in the labor market. Analyze the welfare effects in terms of worker and firm surplus.

e) Suppose instead that the city government tries to increase employment by reducing the social security contributions the firm must pay (that is, it cuts the firm’s taxes). Show what happens in the labor market. Analyze the welfare effects in terms of worker and firm surplus.
Practical question (3.5 points)

Problem 4. Cava y kiwis. (3.5 points)

The inhabitants of the small island of Titirangi in New Zealand are called Titirangans. They like to eat kiwi fruits, which they cultivate themselves (call this $c_H$: home consumption). Titirangans also love to drink cava, which they import from Catalonia (call this $c_F$: foreign consumption). Suppose each Titirangan has the following utility function:

$$U(c_H, c_F) = (1-\gamma)\ln(c_H) + \gamma \ln(c_F),$$

where $\gamma = 0.15$ measures how much the individual likes foreign consumption relative to home consumption.

Each Titirangan has income $R$. The price of kiwis is $p_H$, and the cost of a bottle of cava is $p_F$.

a) Calculate a Titirangan’s demand functions for kiwis and cava. Comment briefly on the results.

b) Calculate:
   1. the income elasticity of the demand for kiwis,
   2. the cross-price elasticity between kiwis and cava,
   3. the price elasticity of demand for kiwis.

c) Suppose the total population Titirangi is 100 people, who have an income of 100 New Zealand Dollars each. Calculate the market demand function for cava in Titirangi.

Suppose that the firms of the Penedés region are the only exporters who sell cava to Titirangi (and that the Titirangans are the only buyers of Penedés cava). Each of these firms has the total cost function $TC(Q)=2Q^{1/2}+5$. Suppose that firms in the Catalan cava market set their prices equal to their marginal costs.

d) Calculate a firm’s marginal cost of producing cava. Using the fact that $p=MC$, calculate $q$ as a function of $p$ (if you do this, you will get the firm’s supply function).

e) Suppose there are 20 firms producing cava in the Penedés region. What is the market supply of Penedés cava?

Given this description of market supply and market demand,

f) Calculate market equilibrium and illustrate it graphically.