Intermediate Microeconomics 301
Final exam
Monday April 30, 2007

Time: 2 hours.

Instructions. To obtain credit, you must give arguments to support your answer. The numbers in brackets at the start of each question are the numbers of points the questions are worth.

Exercise 1 [20]: Angie consumes only goods \( x \) and \( y \) and her utility function is
\[
U(x, y) = xy.
\]
The price of good \( x \) is \( p_x \), the price of good \( y \) is \( p_y \) and she has a weekly income of \( m \).

a. What is her optimal consumption bundle?

b. Initially, the price of good \( x \) is $3, the price of good \( y \) is $1 and her income is 60. How much does she consume of good \( y \)? And of good \( x \)? In a graph represent the budget constraint and the indifference curves of Angie as well as the optimal bundle.

c. The price of good \( y \) increases to $2. How much does she consume of good \( y \)? And of good \( x \)? Represent the changes in the same graph.

Exercise 2 [20]: If each competitive firm in an industry has the short-run cost function \( C(q) = 50 + 5q + q^2 \), and the market price is $35, what is the profit-maximizing output level for each firm? What is the total revenue? What are the profits?

Exercise 3 [20]: Suppose the supply and demand curves for a good are described by the following equations:
\[
q_s = 10 + \frac{1}{2}p \\
q_d = 100 - 2p
\]
where \( p \) is the dollar price of the good.

a. Solve for equilibrium price and quantity. Represent in a graph.

b. Calculate the own price elasticity of demand at the equilibrium price. Is it elastic or inelastic? Give a definition of the elasticity.

c. Imagine that the price of another good goes up and that the two goods are substitutes. The demand becomes
\[
q_d = 100 + a - 2p.
\]
Do you think that \( a \) is positive or negative? Determine the new equilibrium.

Exercise 4 [15]: Two firms currently produce the goods \( q_1 \) and \( q_2 \) separately. Their cost functions are \( C(q_1) = 250 + q_1 \) and \( C(q_2) = 350 + 2q_2 \). By merging, they can produce the two goods jointly with costs described by the function \( C(q_1, q_2) = 450 + q_1 + q_2 \). Are there scope economies in this case that would justify the merger?
Exercise 5 [25]: An industry consists of two firms with identical costs \( C(q) = 10q \). Market demand is \( Q = 150 - p \).

1. What is the industry equilibrium (price, output and profits) if the firms have Cournot beliefs?
2. What is the industry equilibrium (price, output and profits) if the firms have Stackelberg beliefs?
3. What is the industry equilibrium (price, output and profits) if the firms merge?