Wilfrid W. Csaplar Jr., Ph.D. Economics 477 Exam #1 2005/10/03

Write your name on the cover of the test booklet and nowhere else. Failure to follow these directions will cost you 1 point. The test has 150 points (to be scaled up to 250 points) and is scheduled to take 75 minutes. Therefore, expect to spend 1 minute for every 2 points. For example, a 16-point question should take 8 minutes. I can give extra time, but not much.

Show all work on all questions.

1) (8 points) Do EITHER Part A OR Part B.
A) Suppose a firm's total cost function is $TC = 3Q^2 + 4Q^{1/2} + 31Q + 17$. What are the marginal cost and average cost functions? Show all work.
B) What is the inter-temporal budget constraint for consumption and income over a three year period? Briefly explain how you got that formula.

2) (10 points) Do EITHER Part A OR Part B.
A) Is the $U(x, y, z) = x^{1/3}y^{1/3}z^{2/3}$ a legitimate utility function? Explain your logic. If it fails a test, you only need to show that failed test.
B) Suppose you want to maximize U(X, Y) subject to $P_X X + P_Y Y = I$. Use the Lagrangian to prove that $MU_X/P_X = MU_Y/P_Y$.

3) (24 points) Find all Nash equilibria in the following matrix. Prove that you found all and prove they are Nash equilibria. Find the cooperative solution. Explain how you found it. Find both player's safe (secure) strategy. Explain how you found it.

Payoff Matrix		Browns		
		Expensive Tickets	Medium Priced	Cheap Tickets
Steelers	Expensive Tickets	112 99	93 106	94 136
	Cheap Tickets	-7 108	111 113	110 135

4) (36 points) Suppose that both firms are facing the following demand and total cost functions: $P = 82 - 3(Q_1 + Q_2)$ and $TC_i = 100 + 2Q_i + \frac{1}{2}(Q_i^2)$. Use this to derive the best response function for Firm 1 and the equilibrium output for each firm, assuming that the firms are Cournot style firms. What are the outputs and profits of the two firms and the market price? Set up, but do not evaluate, the Lagrangian for the Von Stackleberg leader if the follower behaves as your Cournot firms behave. Show all work.

5) (36 points) Suppose your utility function is given by $U = 9B^{1/3}G^{1/3}$. The price of bananas is \$1/lb and the price of grapes is \$8/lb. Find your utility maximizing level of consumption of bananas and grapes if your income is \$2000. **What is the value of λ?** (Are you full after eating that much fruit?)

6) (36 points) Suppose that labor costs \$6/unit and capital costs \$2/unit and the firm's production function is given by $Q = K^{1/3}L^{1/2}$. Derive formulas for the total cost for an output of Q. DO NOT calculate the value of λ. If you take an n^{th} root of a number, leave it as the n^{th} root rather than entering it into a calculator or simplifying. Show all work.