

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 280 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 will allow some extra time, but I will not allow 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 $TC = 3Q^2 + 4Q^{1/2} + \ln(3Q)$. What are the marginal cost and average cost functions? Show all work.

B) What is the theoretical maximum number of Nash equilibria in the game in Question #3? Explain your logic.

2) (10 points) Do EITHER Part A OR Part B.

A) Is the $U(x, y, z) = 2x^{1/4}y^{1/2} + z^2$ a legitimate utility function? Explain your logic.

B) Why must we do a Lagrangian for the Von Stackleberg leader, but not for the follower?

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		Player 1		
		Very High Price	Medium Price	Very Low Price
Player 2	High Price	11 9	13 6	14 36
	Low Price	7 8	22 21	20 35

4) (36 points) Suppose that both firms are facing the following demand and total cost functions: $P = 35 - 2(Q_1 + Q_2)$ and $TC_i = 100 + 3Q_i + (Q_i^2)$. 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 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 that labor costs \$3/unit and capital costs \$12/unit and the firm's production function is given by $Q = K^{1/4}L^{1/2}$. Derive formulas for the total cost for an output of Q. DO NOT calculate the value of λ . Show all work.

6) (36 points) Suppose your utility function is given by $U = 2F^{1/2}G^{1/2}$. The price of a Fig tree is \$18/unit and the price of a Gold coin is \$50/unit. Find the utility maximizing level of consumption of fig trees and gold coins if your income is \$900. **What is the value of λ ?**