Intermediate Microeconomics - Final

Instructions: This test has two section. The first section covers material since the second prelim. It has 4 problems, worth a total of 50 points. The second section contains material covered in the first part of the course. It has 8 shorter questions worth a total of 50 points.

There are no optional questions.

Please include your name and NetID

Name: _____

NetID: _____

Test Taking Tips: Manage your time so you can put something down for every question. I cannot award partial credit for a blank answer.

If you get stuck and are having trouble with a calculation, just write what you are tying to do and move on.

Part I: Chapters 23-33

Problem 1: Firm & Industry Supply

(14 points)

Problem 2: Monopolies & Factor Markets

(14 points)

Problem 3: Oligopoly & Game Theory

(12 points)

Problem 4: Exchange & Production

(10 points)

Part I Subtotal

(50 points)

Part II: Chapters 1-22

Problem 5: Elasticity

(5 points)

Problem 6: Budget Sets

(5 points)

Problem 7: Utility & Indifference Curves

(6 points)

Problem 8: Income & Substitution Effects

(6 points)

Problem 9: Intertemporal Choice

(7 points)

Problem 10: Uncertainty

(8 points)

Problem 11: Production

(6 points)

Problem 12: Cost Curves

(7 points)

Part II Subtotal

(50 points)

Total

(100 points)

Problem 1: Firm & Industry Supply *(14 points)*

Consider the market for some good made in a perfectly competitive industry. Each firm has a total cost function $TC(q) = 0.5 * q^2 + 10q + 50$
The market demand for the good is $Q = 2000 - 50P$
There are currently 200 firms in this market.

a) Write an individual firm's profit as function of price and quantity, and give the firm's first order condition for profit maximization.

b) For a given price p, what quantity (still for an individual firm) maximizes profit?

c) Write the equation for industry-wide supply as a function of price (there are 200 identical firms).

d) Sketch market demand and short run supply and find the short-run equilibrium price and quantity.

e) How much profit does each firm make (include the 50 for fixed cost)?

In the long run, firms can freely enter or exit the market.

f) In perfect competition, what determines whether firms will enter or exit? Will firms enter or exit in this problem?

g) What determines long run price? What will that price be for this industry? How much will each firm produce?

h) How much will be produced and consumed in the long run equilibrium? How many firms will there be?

[Extra Writing Space]

Problem 2: Monopolies & factor markets *(14 points)*

Sam runs the only saw mill. Pete has a paper making business. His only input is the leftover sawdust from Sam's sawmill (and he can't get sawdust anywhere else). This sawdust is useless to everyone else (so Pete is Sam's only customer for sawdust).

It takes 1 ton of sawdust to make 1 ton of paper. Assume that there are no fixed cost for either Pete or Sam.

The demand for paper is given by: $P = 100 - 2Q$

a) Write Pete's profit as a function of the quantity of paper and marginal cost (which is the price of a ton of sawdust). Solve for the profit maximizing quantity of paper as a function of marginal cost (the price of sawdust).

b) Write Sam's profit as a function of the price of sawdust. What price should Sam charge for sawdust to maximize his profit? What would his profit be?

c) If Pete has to pay the price in (b), what price should he charge for paper? What would his profit be? What would consumer surplus be? What would total social welfare be? (note: when FC $= 0$, then PS $=$ Profit)

d) If Sam & Pete decided to work together running the sawmill and making paper, what price would they set for paper? How much profit would they make? What would total social welfare be?

e) How do these two cases compare to the social welfare under perfect competition? Explain why merging the two companies (and decreasing competition) moves social welfare closer to the perfectly competitive case.

Problem 3: Oligopoly & Game Theory *(11 points)*

Ralph and Tommy are the only two companies that make collared shirts. Market demand for the shirts is given by $P = 30 - 0.5Q$, where $Q = q_R + q_T$ is total output. Marginal cost for both companies is \$6. Ralph and Tommy compete in a quantity setting game.

a) Write Ralph's profit as a function of Ralph's quantity and Tommy's quantity. If Ralph takes Tommy's quantity as given, what quantity will Ralph choose to maximize Ralph's profit?

b) Graph the reaction functions for Ralph and Tommy. If the two firms simultaneously choose output (a la Cournot), what is the Nash equilibrium? Explain why this is a Nash equilibrium.

c) If Ralph and Tommy colluded to maximize total profit, what total output would they choose? Add the possible output combinations of Ralph and Tommy's quantities to your graph.

d) Briefly explain potential difficulties that the firms may face if they try to collude. You do not need to use numbers, but do use the concept of a Nash equilibrium. (Don't worry about regulations/antitrust.)

Problem 4: Exchange *(11 points)*

Norm and Cliff both get utility from consuming Beer and Pretzels. They both have smooth, strictly concave utility functions. Norm has 20 pretzels and 1 beer and Cliff has 4 pretzels and 5 beers.

a) Draw the Edgeworth box (include units).

b) Show the endowment point.

c) Assume that the endowment point is well off the contract curve. Graph the initial utility levels associated with the endowment point for both Norm and Cliff.

d) Show the set of points where both Norm and Cliff are better off than with the initial endowment (these are the Pareto preferred points).

e) Graph the Pareto optimal points that are Pareto preferred to the endowment point.

Problem 5: Elasticity *(5 points)*

a) Both elasticity and slope measure relationships between two variables and how they change together. Explain the difference in what they capture.

b) If a monopolist firm is trying to maximize total revenue, and the only thing they know about demand (aside from how much is being purchased at the current price) is that at the current price point demand is inelastic, what should they do to price?

Problem 6: Budget Sets *(5 points)*

If Sarah spends all her money on carrots she can buy 100 carrots. If she spends all her money on soda she can buy 25 sodas.

a) What is the price ratio of carrots to soda?

b) If carrots cost $0.50, how much money would she need to buy 60 carrots and 10 sodas?

Assume that both carrots and sodas are normal goods, and assume her bundle of 60 carrots and 10 sodas was her optimal bundle given her money and the prices from (b).

c) If the price of carrots increases to $0.60, how would her optimal consumption of carrots change (directionally)? How would her optimal consumption of sodas change (directionally)?

Problem 7: Utility & Indifference Curves *(6 points)*

Bob thinks Pepsi is twice as good as Coke. Joe can't tell the difference.

a) Give some utility functions that capture the taste of Bob and Joe.

b) Sketch some indifference curves for Bob, and on a separate graph sketch some indifference curves for Joe. Be sure to label your axes and intercepts.

Problem 8: Income & Substitution Effects *(6 points)*

a) When the price rises people's behavior changes as they generally will substitute away from the more expensive good and towards the cheaper good. Why do observed behavioral changes not capture what economists call the substitution effect?

b) What are two methods for isolating the substitution effect, and how do they differ?

c) If for economic goods more is better, why would anyone decrease their consumption of a good with an increase in income?

Problem 9: Intertemporal Choice *(7 points)*

The interest rate, r, is 5%. Sally and Betty have identical endowments $10.00 in period 1, and $11.55 in period 2. Sally is a net saver while Betty is a net borrower.

a) What is the present discounted value of Sally's endowment? Betty's endowment?

b) Illustrate Sally and Betty's budget lines on two separate graphs.

c) In each graph add an indifference curve showing optimal choice consistent with borrowing or savings behavior. Label the amount saved or borrowed on the graph.

Suppose the interest rate increases to 10%.

d) Has the present discounted value of Sally's endowment increased or decreased? Betty's?

e) Represent this new interest rate and the new choices associated with it. Is Sally better off or worse off? What about Betty?

Problem 10: Uncertainty *(8 points)*

Mr. Gordon owns a car, the value of which is \$81. If he crashes the car he can sell the wreckage for scrap and get \$9. His utility over the value of the car is $u(c) = c^{1/2}$. There is a 1/9 chance that he crashes the car.

a) Graph Gordon's utility from \$9 to \$81.

b) On the graph, indicate the amount of utility he would obtain if he crashed, and if he didn't crash.

c) What is the expected value of the car (before he either crashes or doesn't crash)? Show this on your graph.

d) What is his expected utility (again, before he either crashes or doesn't crash)? Show this on your graph.

e) Graphically indicate the maximum amount he would be willing to pay to insure his car.

Problem 11: Production *(6 points)*

For the following production functions, roughly sketch some isoquants:

a) $y = kl$

b) $y = \min\{2k, 3l\}$

c) $y = 2k + 3l$

State whether the following functions exhibit increasing returns to scale, decreasing returns to scale, or constant returns to scale:

d) $y = k^{.3} l^{.7}$

e) $y = \min\{k^{1.5}, l^{1.7}\}$

f) $y = k^{.9} + l^{.9}$

Problem 12: Cost Curves *(7 points)*

Mr. McDonald's cost function is the quadratic function:

$$c(y) = 0.02y^2 + 0.6y + 100$$

a) Express the following for Mr. McDonald's farm as a functions of quantity:

   i) fixed cost

   ii) variable cost

   iii) average fixed cost

   iv) average variable cost

   v) average cost

   vi) marginal cost

b) Roughly sketch the following cost curves on one graph:

   i) his average cost

   ii) average fixed cost

   iii) marginal cost

   iv) average variable cost