

1) (15 pts.) You hire laborers to weed crops on your vegetable farm. The table below reports the boxes of tomatoes yielded in a week with different numbers of laborers hired to do weeding.

Laborers Hired	Boxes of Tomatoes	Marginal Product	Value of Marginal Product
1	600	--	--
3	1800		
5	2400		
7	2600		

- a) Using numbers given in this table, show below how to calculate the Marginal Product for one example, and then fill in the Marginal Product column in the table above.
- b) Tomatoes sell for \$3.00/box. Using numbers from this table, show below how to calculate the Value of Marginal Product for one example, and then fill in the Value of Marginal Product column in the table above.
- c) What optimality condition defines the profit maximizing amount of the input to use? (Be brief and to the point.)
- d) If wages, taxes, liability insurance, etc. cost \$600/week to hire a laborer, what is the profit maximizing number of laborers to hire? (You may need to interpolate between entries.)

2) (15 pts.) Wheat yield as a function of nitrogen fertilizer is $Y = 35 + 2N - 0.02N^2$, where yield Y is bu/ac and the nitrogen rate N is lbs/ac. The price of wheat is \$10.00/bu and the price of nitrogen \$0.60/lb.

a) What is the economically optimal nitrogen rate? Set up and solve this economic problem using calculus and the given information (Be sure to check the second order condition).

b) At the nitrogen rate you derived in part a, what is yield (bu/ac)?

c) Besides the cost of nitrogen, other fixed costs are \$400/ac. What are net returns (\$/ac)?

3) (15 pts.) Laying hens fed the following corn and soybean meal rations produce 1 egg per day.

Soybean Meal (oz)	Corn (oz)	Marginal Rate of Technical Substitution
5.0	10.0	---
6.0	9.0	
7.0	7.5	
8.0	5.0	

a) Using numbers from this table, show below how to calculate the Marginal Rate of Technical Substitution between soybean meal and corn for the second row in the table and then fill in the missing entries in the table above.

b) What optimality condition defines the profit maximizing amount of both inputs to use? (Be brief and to the point.)

c) If soybean meal costs \$470/ton and corn costs \$210/ton, what is the profit maximizing level of each to feed? (Note: 1 ton = 2,000 lbs and you may need to interpolate between entries.)

4) (20 pts.) Corn production is $Y = 9S - 0.1S^2 + 2N - 0.01N^2 - 0.01SN$, where Y is corn yield as bushels per acre, S is the seeding rate as 1,000 seeds per acre and N is nitrogen fertilizer as pounds per acre. The corn price is \$5/bu, the price of corn seed is \$2 for 1,000 seeds, and the price of nitrogen is \$0.60 per pound.

What is the profit maximizing amount of seeds (S) and nitrogen (N) to use per acre to grow corn? (Note: you will not need to convert prices to set up the profit function.) Be sure to check the second order conditions.

5) (10 pts.) Your friend is a farmer and asks you for advice when he gets a job offer. From tax records, his typical annual farm revenue is \$730,000 and all annual costs are \$660,000. He says the farm's market value is \$800,000, but he still owes \$600,000 on the mortgage. The new job offer is for \$60,000 per year. You think your friend could earn 10% annually if he sold the farm and invested his money in a money market mutual fund.

a) What is your friend's economic profit for owning and operating the farm?

b) Your friend says his goal is to make as much money as possible and, since he is making \$70,000 per year as a farmer, he does not think he should take the \$60,000 per year job offer. Does this make sense? Explain what is your friend forgetting in his analysis?

6) (15 pts.) The table below reports the cost of producing eggs (dozens per year) for a farm.

Eggs (dozens/yr)	Fixed Cost	Variable Cost	Total Cost	Marginal Cost	Average Variable Cost	Average Total Cost
18,000	10,000	15,000	---	---	---	---
24,000	10,000	21,000				
28,000	10,000	27,000				
31,000	10,000	33,000				

a) Using numbers from this table, show below how to calculate Total Cost, Marginal Cost, Average Variable Cost, and Average Total Cost for the second row and then fill in the missing values in the table.

b) What optimality condition defines the profit maximizing amount to produce? (Be brief and to the point.)

c) At an egg price of \$1.75/dozen, what is the profit maximizing amount of eggs to produce?

7) (10 pts.) Provide short answers to the following questions:

a) (2.5 pts.) Briefly explain the difference between a strategy and a goal in Strategic Management and provide one example of each.

b) (2.5 pts.) Give one reason why it can be optimal for a farmer to continue to produce, even though his/her economic profit is negative. Extra credit (2 pts.), give a second reason.

c) (2.5 pts.) Briefly explain what Opportunity Cost is and give one example.

d) (2.5 pts.) Briefly explain what the author of “What It Takes To Be Great” means by Deliberate Practice and why it is what it takes to be great.