Midterm exam

3/8/11

Note: Support your answers by showing your work and thoroughly explaining any answers. Points will be deducted for insufficiently supported answers. When in doubt, err on the side of writing too much. This exam is out of 75 points. Therefore, you should allocate about 1 minute/point.

Problem 1 (25 points (12, 13)) Answer the following two questions about perfectly competitive markets:

a. There are many taxi drivers in New York City, all of whom sell identical taxi rides. Taxi drivers in New York are required to hold a special license to operate, and the government only issues 5,000 licenses. Will these drivers necessarily earn zero profit in the long run, or is it possible for them to earn positive profit?

In a competitive market, firms enter or exit until there is zero profit. Suppose that in the market for NYC taxi licenses, this would happen when there are 7,500 tax cabs. That there are only 5,000 licenses meanse that entry is artificially halted before the long-run equilibrium number of taxis. While further entry would shift the market's supply curve to the right, lowering price and thus profit, since this entry is prohibited, price would stay abot the zero-profit price and profits would stay positive. So, no, it is not necessarily the case that a competitive market without free entry will converge to zero economic profits.

b. Carlos owns a gas station in Lexington. Carlos estimates his total costs are given by $TC = 400 + .01q^2$ and his marginal costs are given by $MC = .02q$. The price of gas is currently \$3.75/gallon. Should Carlos stay in business in the long run? In the short run?

The highest profit Carlos can obtain is $-\$48/44$ (to find this, set the price of \$3.75 qual to his marginal cost to get Carlos' profit-maximizing quantity, and then calculate profit=revenue - cost from there). Since he is losing money, he clearly should shut down in the long run. However, net of his fixed costs of \$400, Carlos is actually profitable, and so there is no reason to shut down in the short run.

Problem 2 (25 points (5, 5, 5, 10)) Jonathan is indifferent between eating 8 pork bellies and 3 crab cakes (bundle A) and eating 12 crab cakes and 2 pork bellies (bundle B). He dinner budget is \$30. One pork belly costs \$3, and one crab cake costs \$2.

a. Is Jonathan likely to prefer eating 6 pork bellies and 6 crab cakes to bundles A and B? Answer yes, no, or uncertain, and explain why (a picture will help a lot).

For parts a-c, see the figure at the end of this document. For part a, we know that the 3 points A, B, and $(6, 6)$ are all on the same line (in fact, they are all on Jonathan's budget line). Since Jonathan is indifferent between points A and B, there must be an indifference curve going through points A and B, as pictured, and the point $(6, 6)$ must necessarily be to the northeast of this curve, as pictured. Therefore, Jonathan will prefer bundle $(6, 6)$ to points A and B.

b. Is Jonathan likely to prefer eating 4 pork bellies and 10 crab cakes to bundles A and B? Answer yes, no, or uncertain, and explain why.

$(4, 10)$ is to the Northeast of Jonathan's budget line, but is clearly to the Southeast of bundle B, as pictured. As such, it must be to the Northeast of the indifference curve through points A and B, and so must be preferred to both bundles.

c. Is Jonathan likely to prefer eating 5 pork bellies and 5 crab cakes to bundles A and B? Answer yes, no, or uncertain, and explain why.

There is not enough information to answer this question. As pictured, $(5, 5)$ is to the Southwest of the indifference curve through A and B, and so is worse than either of those bundles, but if the indifference curve had a bit more curve to it, it's easy to see that $(5, 5)$ would then be to the Northeast of the indifference curve. So the answer depends on the curvature of Jonathan's indifference curve, about which we are told nothing.

d. Now suppose that last week, when a pork belly cost \$5 and a crab cake cost \$1, Jonathan maximized his utility be eating 5 pork bellies and 5 crab cakes for dinner (he had the same budget of \$30). Is there enough information to tell whether Jonathan is better off or worse off this week now that a crab cake costs \$2, while a pork belly costs only \$3?

Jonathan maximized his utility by eating 5 crab cakes and 5 pork bellies last week, meaning this bundle was better than all other affordable bundles in Jonathan's eyes. This week, prices have changed and so the set of affordable bundles has changed but, importantly, the bundle $(5, 5)$ is still affordable, and so Jonathan cannot possible be worse off than he was last week. Indeed, since Jonathan has new bundles to choose from that were not affordable last week, he must be better off, since some of these new bundles are to the Northeast of the bundle $(5, 5)$.

Problem 3 (25 points (10, 15)) Answer the following questions about expected utility and risk aversion:

a. True/false/uncertain: Greg, who is risk averse, prefers a salaried job that will pay him \$50,000 with certainty to a commission-based job that will pay him \$20,000 with probability .5 and \$80,000 with probability .5. (Explain why you think it is true, false, or uncertain. Points will not be awarded without this explanation.)

This is true. Both jobs have the same expected value, but the salaried job is riskless, while the commission-based job is not. A risk-averse individual such as Greg would in fact be willing to take a lower salary at the first job and still prefer it to the second job.

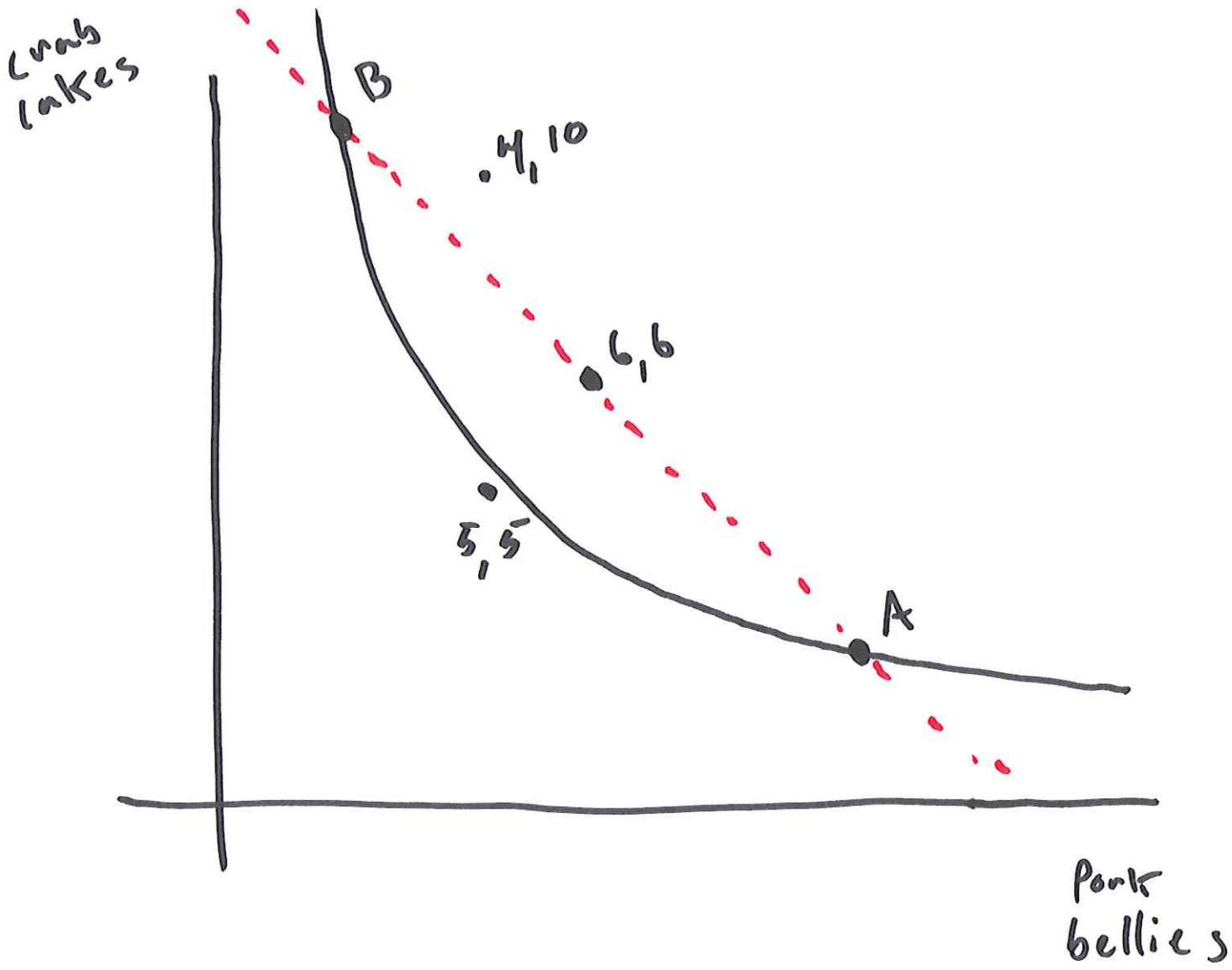
b. Bill is an English PhD student; there is some chance he will get a prestigious university job that will pay him \$100,000/year (probability p). If he does not get this job, he will have to take a job at Starbuck's, paying \$30,000/year (probability $(1 - p)$). Bill's utility function over salary is given by $\sqrt{w}$. Before Bill has a chance to finish his PhD, he is offered a job at Dunder Mifflin paying \$50,000/year. How low does p have to be before Bill is better off taking the Dunder Mifflin job? (hint: p is some number between 0 and 1. For example, $p = .25$ means there is a 25% chance of Bill getting the university job and a 75% chance of his working at Starbuck's.)

Solve for the value of p that would leave Bill indifferent between working for Dunder Mifflin and completing his degree:

$$\text{Expected utility from finishing degree: } p\sqrt{100,000} + (1-p)\sqrt{30,000} \quad (1)$$

$$\text{Expected utility from working at Dunder Mifflin: } \sqrt{50,000} \quad (2)$$

Equating (1) and (2) gives $p = .35$. Therefore, if there is at least a 35% chance that Bill will get the university job, he prefers to finish his degree.


Crab lakes
B
4, 10
6, 6
5, 5
A
Pork bellies