

## More Midterm 2 Exercises Aug 7, 07

1. Charles LaSalle is a farmer in Dubuque, IA. He produces corn (good 1) and soybeans (good 2). This year, his crop amounts to 30 bushels of soybeans and 10 bushels of corn.

(a) Assume Charles is a self-supporter. Draw his endowment point  $E$  into the graph below.

(b) Over time, he finds out that he doesn't like to eat the combination of soybeans and corn all the time and realizes that he actually has preferences that follow the utility function

$$u(x_1, x_2) = 4x_1^4 x_2^2.$$

Algebraically find his optimal demand functions with the general expression for the budget line  $p_1 x_1 + p_2 x_2 = m$  by using the Lagrange method or any other algebraic approach that involves finding the tangency condition.

c) Charles thinks he should change his situation and try to sell some of his crop in order to reach a higher utility level. He drives his crop to market and finds out that corn sells for \$3 per bushel and soybeans sells for \$2 per bushel.

Algebraically find his original choice  $A$ . Graphically illustrate the situation in the same diagram above. Is he a net seller or net buyer for corn? How much corn does he sell/buy, how much of soybeans?

(d) Now assume that the price for corn increases to  $p_1' = 4$ . Find his substitution effect both mathematically and graphically using the Slutsky assumption of purchasing power compensating with respect to the original bundle. Indicate the numeric value of the substitution effect.

Mathematically and graphically find his ordinary income effect and his endowment income effect and write down the numeric value of those, as well as of the total effect. Make sure you have marked all necessary budget lines and points and labeled them with their income  $m$ .

e) Write down Charles' Slutsky equation for buying and selling. Can you tell from the sign of the substitution effect and the (combined) income effect that Charles will reduce consumption because of the price increase? Refer to each part of the equation and explain what direction of demand change the equation predicts in this case, both verbally and graphically.

2. Peter Morgan sells pigeon pies from a pushcart in Central Park. Morgan's cost function is  $C(y) = 0.5y^2$ . He is the only seller of pigeon pies in Central Park. The inverse demand curve for this delicacy is  $p(y) = 120 - y$ , where the price  $p$  is measured in cents and  $y$  measures the number of pies sold. Find the price and quantity that maximize Morgan's profit. Find Morgan's profit.