

ECO 401-001
 Spring 2005
 Problem Set #4

Due: Tuesday, March 22, 2005

Use the following information in answering questions 1 and 2:

Production Function for Corn (bushels of corn produced per year):

Number of acres cultivated per year	Tons of fertilizer employed per year					
	1	2	3	4	5	6
1	50	150	275	375	450	500
2	150	370	550	700	825	900
3	240	500	740	940	1080	1160
4	300	660	920	1060	1190	1270
5	330	790	1050	1160	1250	1320
6	340	900	1160	1250	1300	1330

- In a diagram (use graph paper), draw the total product curve for fertilizer when the amount of land used is 2 acres. Then (in a separate diagram) draw the average product and marginal product curves that correspond to the total product curve.
 - Now draw the total product curve for land when the amount of fertilizer used is 2 tons. Also draw the associated average and marginal product curves.
 - Finally, in yet another diagram, sketch two points on the isoquant associated with $Q = 500$ and three points on the isoquant associated with $Q = 1160$.
- Suppose the farmer uses 1 ton of fertilizer and 1 acre of land. Over time he expands production by increasing the use of both inputs proportionately. Does the farmer experience increasing, constant, or decreasing returns to scale as he expands? Explain briefly.
- You find that when you use 8 quarts of insecticide in combination with 16 lbs. of fertilizer, you are able to produce 45 lbs. of zucchini squash in your garden. If you use 22 lbs. of fertilizer, output rises to 50 lbs. of zucchini. If you then cut back on insecticide to 6 quarts, zucchini output falls back to 45 lbs. (a) Draw the isoquants corresponding to 45 and 50 lbs. of zucchini. (b) What is the marginal rate of technical substitution between fertilizer and insecticide between the two points that you have on the isoquant for 45 lbs.
- The relationship between output and inputs is given by the equation: $Q = L^{.5}K^{.5}$. Sketch the isoquant corresponding to an output of $Q = 10$. Indicate in your diagram at least 5 combinations of L and K that lie on the isoquant. Also indicate how the $MRTS_{L,K}$ is illustrated between any two of these combinations of L and K .