

Homework # 4

1) The following table represents an annual production function for corn. The first column indicates the amount of land used (acres per year) and the first row indicates the amount of labor used (number of workers 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	1050	1250	1300	1330

- Using the above production function, calculate total output, the average physical product of labor (APP_L), and the marginal physical product of labor (MPP_L) when the amount of land is fixed at 3 acres.
- Suppose the farmer uses 1 worker 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?
- If the amount of land is held fixed at 3 acres, when do diminishing marginal returns for labor set in?

2) You are currently going to college. Consider yourself to be a "firm" utilizing inputs to produce an output. What is the output? What are the inputs you use to produce the output? Describe a situation when diminishing marginal returns applies.

3) Starbucks finds that as it increases the number of workers it hires, the number of mochas produced weekly changes as follows:

Workers	Mochas
1	100
2	300
3	600
4	1000
5	1350
6	1650
7	1900
8	2100
9	2250
10	2350
11	2400
12	2400
13	2350

- The price of mochas can be \$3 or \$4 each. For each number of workers, calculate the marginal physical product of labor (MPP_L) and the two marginal revenue products of labor (MRP_L) corresponding to the two mocha prices.
- Plot the MPP_L curve and indicate the phases of increasing returns to labor, diminishing returns, and negative returns.
- Assume the price of mochas is \$3. If the wage rate of labor is \$600 a week, how many workers will Starbucks hire? Note: there are 2 employment levels at which the wage equals the MRP_L. Explain why you picked one and not the other.
- When the wage falls to \$400, what will the new employment level be? Carefully explain why the next worker is not hired.
- How does the employment change when the price of mochas rises from \$3 to \$4, if the wage rate remains at \$400?