

## Homework #6

Pam owns a public relations firm that produces flyers, press releases and websites. For simplicity, assume that she out-sources the printing, so that we can ignore inputs of printing machinery and paper.

Pam's firm produces public relations material using two inputs: computers (a form of capital) and the efficiency with which her workers (labor) use those computers. Computers and the efficiency of labor are perfect complements in Pam's production process.

For the past few years, Pam has not noticed any changes in either the labor that she hires or the computers that she rents. Lately however, her workers have been attending Prof. Doviak's classes and, as a result, they have become much more productive!

Pam pays the same rental rate for her computers and the same wage rate to her workers, but now each worker produces twice as much public relations material as they did before, using the same equipment (computers) that they did before.

1. The slope of Pam's isocost and the slope of Pam's isoquant are both defined in terms of two "inputs." What are those two inputs?
2. How will the increase in the efficiency of labor affect the relative rental rate for computers?
3. How will the substitution effect alter Pam's optimal employment of computers and labor efficiency?
4. If Pam continues to produce at the same total cost, can she now produce more public relations material, less public relations material or the same amount as before?
5. If Pam continues to produce at the same total cost, how will her optimal employment of computers and labor efficiency change?



Julia is a college student. Her utility depends on her consumption of two goods: hamburgers and cocaine. Assume that Julia's Marginal Rate of Substitution (MRS) between hamburgers and cocaine is constant and equal to six hamburgers per line of cocaine, so that hamburgers and cocaine are perfect substitutes in Julia's utility function.

The price of a hamburger is \$5. The price of one line of cocaine is \$10. Since Julia is a student, an allowance from her father is her sole source of income. Her father gives her \$120 per week.

1. If Julia did not consume any cocaine, how many hamburgers could she consume?
2. If Julia did not consume any hamburgers, how many lines of cocaine could she consume?
3. Placing hamburgers on the vertical axis and cocaine on the horizontal axis, draw Julia's budget constraint.
4. On the same graph that you drew Julia's budget constraint, draw her indifference curve using the assumption that Julia's MRS is constant and equal to six hamburgers per line of cocaine. Be sure to indicate the point at which her utility is maximized.
5. Will Julia consume both hamburgers and cocaine? Will she consume only hamburgers and no cocaine? Or will she consume only cocaine and no hamburgers? Explain your answer.

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Now Julia graduates college. Since she has graduated, her father no longer gives her an allowance. To fund her purchases of hamburgers and cocaine, Julia now needs to work.

She gets a job at a bank and receives \$5 for each hour that she works. She is expected to work 24 hours per week, but when she consumes cocaine she arrives at work late the next day and is unable to make up the hours that she missed (resulting in a loss of income). Specifically, the number of hours that she misses is equal to the square of the number of lines of cocaine that she snorts:

$$\text{missed hours} = c^2 \quad \text{where: } c \text{ is the number of lines of cocaine that she snorts.}$$

In other words, if she snorts one line she misses one hour of work. If she snorts two lines, she misses four hours of work. If she snorts three lines, she misses nine hours of work, etc.

6. If Julia did not consume any cocaine, how many hamburgers could she consume now?
7. If Julia did not consume any hamburgers, how many lines of cocaine could she consume now?
8. Placing hamburgers on the vertical axis and cocaine on the horizontal axis, draw Julia's new budget constraint. (Hint: Avoid clutter. Draw her new budget constraint on a new graph).
9. On the same graph that you drew Julia's new budget constraint, draw her new indifference curve using the assumption that Julia's MRS is constant and equal to six hamburgers per line of cocaine. Be sure to indicate the point at which her utility is maximized.
10. Will Julia consume both hamburgers and cocaine? Will she consume only hamburgers and no cocaine? Or will she consume only cocaine and no hamburgers? Explain your answer.

Answer the following questions about how working affects Julia's consumption decisions and utility levels.

11. Has Julia's optimal consumption of hamburgers changed since she graduated? Why or why not?
12. Was Julia's level of utility higher or lower before she graduated? Explain your answer.

Hint #1: When thinking about this last question, you may want to look at a graph that contains Julia's old and new budget constraints and Julia's old and new indifference curves.

Hint #2: No. You do not have to graph the income and substitution effects.