

# Micro Principles

Georgetown University School of Foreign Service in Qatar  
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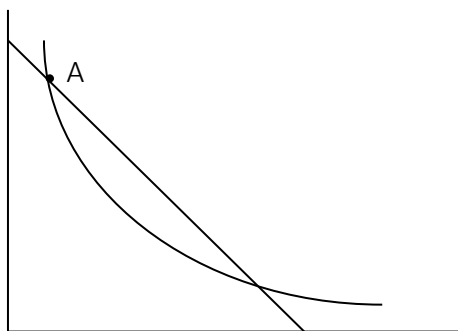
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## Problem Set 6

Due in class on June 16, 2019.

### Review Questions on Consumer Behavior

1. Write a grammatically correct one-sentence definition of an indifference curve.
2. Write a grammatically correct one-sentence definition of the budget constraint for two goods. Also show how the equation for the budget constraint is derived from the expenditure equation.
3. Consider the consumer initially at point A in the following diagram:



Label the diagram and write a *brief* explanation of the consumer's move from A to equilibrium. Note this requires you to show the equilibrium on the diagram.

**Chapter 10 Problems** (page 248): 3, & 4.

### Three More Problems.

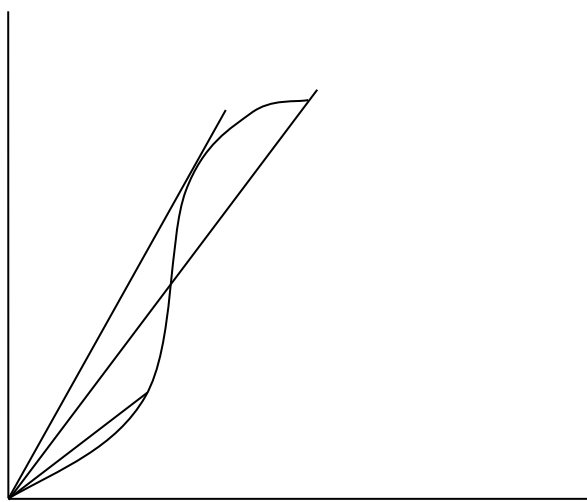
Read the Mathematical Note on pages 442 & 443. If you know how to use Excel, do so.

1. Suppose you invest \$100 for ten years. The interest rate is  $r = 0.06$  (six percent) per year and the interest payment is reinvested (added to the principal) each year. Calculate the interest payment and future value (FV) at the end of each year.
2. Suppose you expect to receive \$100 per year for ten years: the first payment is one year from today and subsequent payments occur annually on this date. The interest rate is  $r = 0.10$  (ten percent) per year. Calculate the present value (PV) of each year's payment. Calculate the present value (PV) of the full stream of future payments.
3. You need to review the lecture notes to answer this problem. Suppose you want to buy an asset that pays you \$100 per year forever. The interest rate is  $r = 0.09$  (nine percent). How much should you pay for this asset?

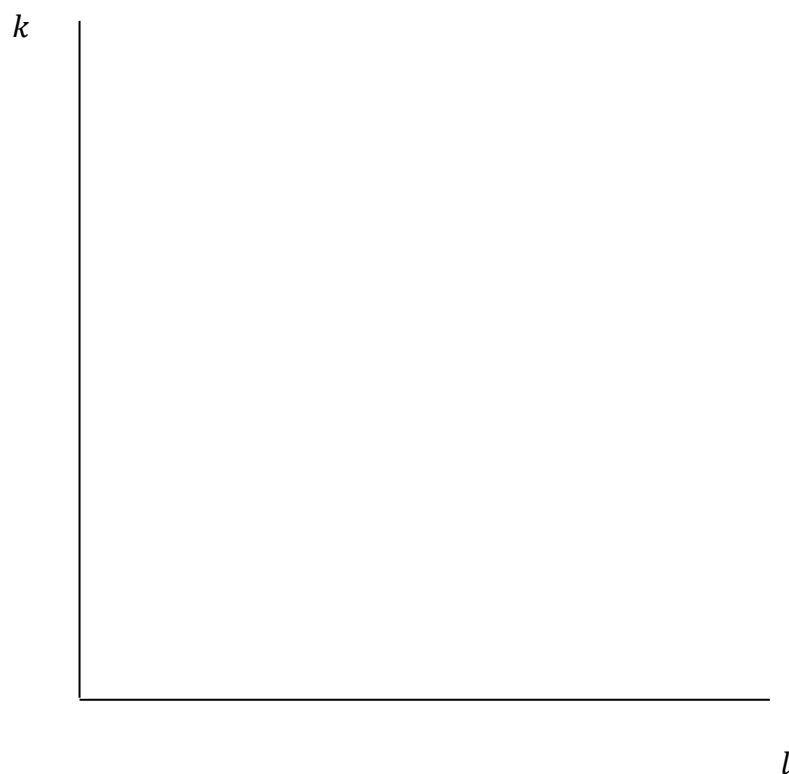
## Chapter 11 Problems

1. This problem is related to Chapter 11, pages 256 – 263. Consider the Total Product (TP) curve given below. Three rays from the origin touch the TP curve at four points. Label these points (A, B, C, D). Now consider the slope of the ray from the origin to each point and the slope of a line tangent to TP at each point.

Use the relationships among the slopes to plot the Average Product (AP) and Marginal Product (MP) curves on the set of axes below. You need not “calculate” specific numbers; just examine the slopes and determine which are higher and lower, and which are maximums or zero. Be sure to label the axes completely on both graphs.



2. Imagine a firm that only uses capital (K) and labor (L). Use an isocost / isoquant diagram to illustrate the firm's equilibrium input mix for given prices of capital and labor and a given rate of output. Now illustrate what happens if the price of labor falls, and the firm wants to produce the same rate of output. What happens to the cost of production? Compare the relative marginal products of labor and capital (the MRTS) at the two equilibria.



3. This question is related to Chapter 11, pages 257 – 259. The table below gives the Total Variable Cost (TVC) for producing various quantities of smurfs (smurfs are an input into cat food production). The Total Fixed Cost (TFC) is \$100.

Calculate the following for every output rate: Total Cost (TC), Average Fixed Cost (AFC), Average Variable Cost (AVC), Average Total Cost (ATC), and Marginal Cost (MC).

Plot TFC, TVC, and TC on a graph. Plot ATC, AVC, and MC on another graph. Use reasonable scales.

This problem requires extensive calculations and careful graphing. I recommend you use Excel.

#### Costs of Smurf Production

Output Rate						
Smurfs per Week	TVC	TC	AFC	AVC	ATC	MC
0	0					
1	10					
2	19					
3	27					
4	34					
5	40					
6	45					
7	50					
8	56					
9	63					
10	71					
11	80					
12	90					
13	101					
14	113					
15	126					
16	140					
17	155					
18	171					
19	188					
20	206					
21	225					
22	245					
23	266					
24	288					