**Economics 101**
**Fall 2011**
**Answers to Homework #5**
**Due 11/17/11**

**Directions:** The homework will be collected in a box **before** the lecture. Please place your name, TA name and section number on top of the homework (legibly). Make sure you write your name as it appears on your ID so that you can receive the correct grade. Please remember the section number for the section **you are registered,** because you will need that number when you submit exams and homework. Late homework will not be accepted so make plans ahead of time. **Please show your work.** Good luck!

**Please realize that you are essentially creating "your brand" when you submit this homework. Do you want your homework to convey that you are competent, careful, professional? Or, do you want to convey the image that you are careless, sloppy, and less than professional. For the rest of your life you will be creating your brand: please think about what you are saying about yourself when you do any work for someone else!**
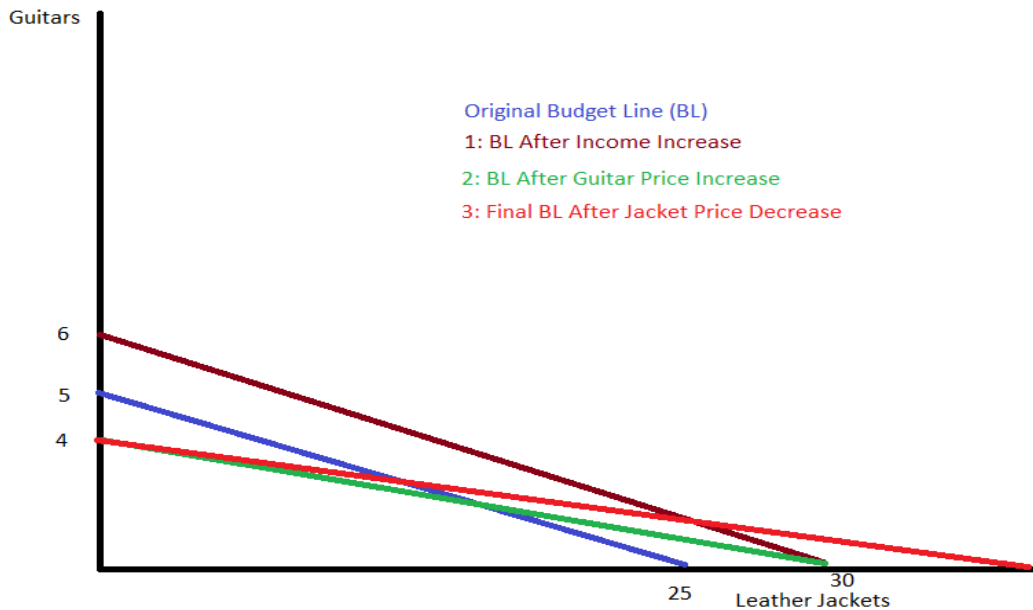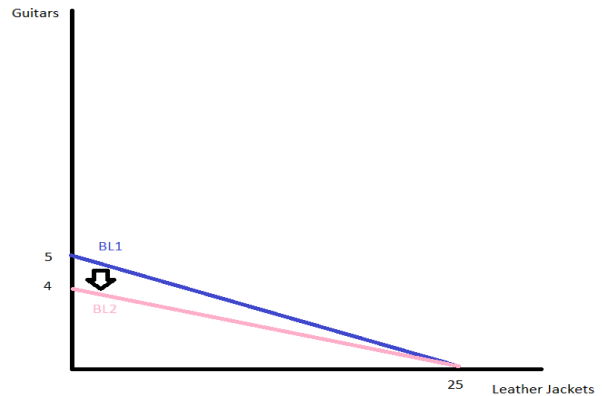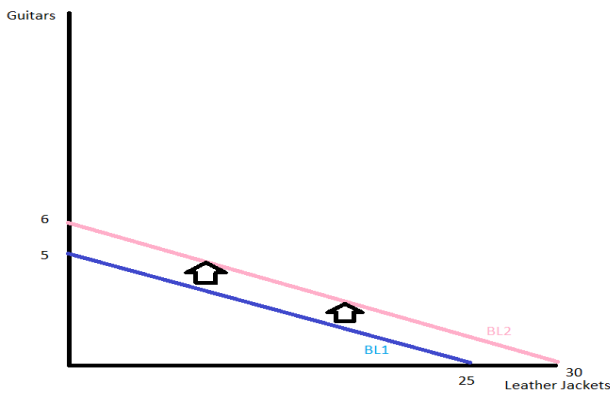
1) Consider the budget line depicted below:
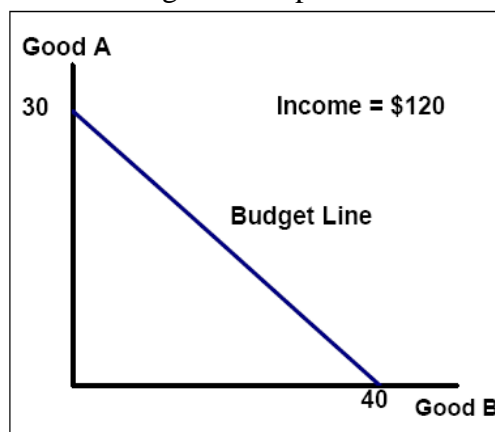


a) What is the price of good A?  Price of Good A = $4
b) What is the price of good B?  Price of Good B = $3
c) Write the equation of the line in slope-intercept form. What is the slope of the budget line?  A = 30 - (3/4)B, the slope of the BL is -3/4
d) How is the slope of the budget line related to the ratio of the two prices?
   The slope of the budget line = -(Price of Good B/Price of Good A)

2) Suppose Mike Myers consumes only leather jackets and guitars. He has an income of $10,000. Jackets cost $400 each, while the price of guitars is $2,000 each. On a separate graph for each part below show how each of the following changes affects Mike's budget line. On your graphs, put jackets on the horizontal axis and guitars on the vertical axis. Label your graphs carefully and completely. On your graphs show the initial budget line, BL1, as well as the new budget line, BL2.

a) Due to an increase in sales of Mini-Me dolls, Mike's income increases by 20%.
b) Due to the eminent retirement of Eric Clapton, the price of guitars increases by $500 each, (even the unsigned ones).
c) Mike's income increases by 20%, the price of guitars increases by $1,000, and the price of jackets decreases by $100, all at the same time.





Original Budget Line (BL)
1: BL After Income Increase
2: BL After Guitar Price Increase
3: Final BL After Jacket Price Decrease

3) This exercise will sharpen your skills with income and substitution effects. Draw a preliminary graph with whippers on the y-axis and snappers on the x-axis. On this graph include a generic budget line and a set of normal indifference curves that are downward sloping and bowed in (convex) toward the origin (convex). For each of the following situations, redraw the preliminary graph you've just designed and as explicitly as possible demonstrate the following changes. (HINT: you will need to adjust your indifference curves in order to illustrate the following scenarios!) On your graphs you will want to indicate the size and direction of the income and substitution effects as well as the location of the intermediate point (Professor Kelly refers to this as "Point C" in her examples) used to calculate the income and substitution effects.

    a) Price of whippers decreases, both whippers and snappers are normal goods
    b) Price of whippers increases, whippers are a normal good, snappers are inferior
    c) Price of snappers increases, whippers are normal and snappers are inferior goods
    d) Price of snappers increases, both whippers and snappers are normal goods

D
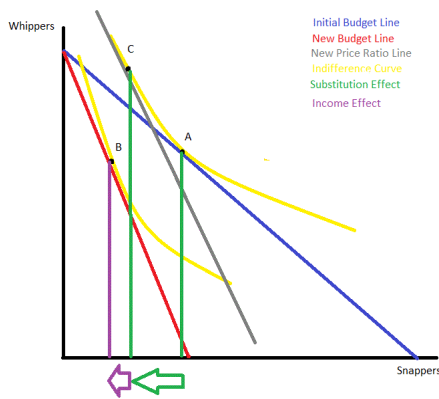


C
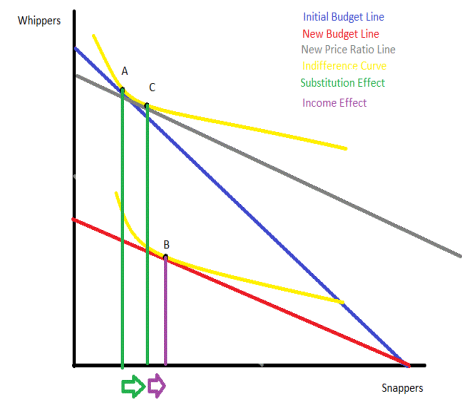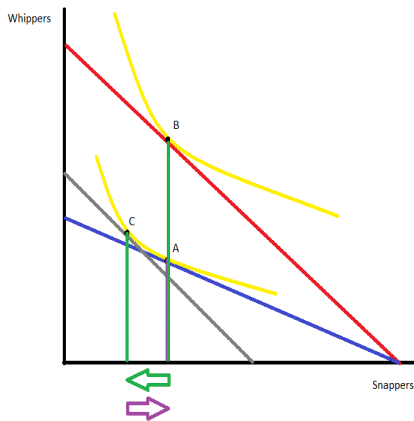


A

B

4) Consider the market for light bulbs.  Write your own (linear) demand equation for light bulbs (Q) as a function of income, price of light bulbs & the price of lamps. It should satisfy the law of the demand, but other than that you are free to exercise your creativity. Hint: there are an infinite number of possible equations-your equation will likely be different from other students' equations. Use this equation to answer the following questions:

    a)  What is the income elasticity of demand for light bulbs?  What does that tell you? (Hint: to find the income elasticity of demand for light bulbs, use the point elasticity formula but modify it to consider the relationship between income and quantity rather than price and quantity.)

    b)  What is the cross-price elasticity of demand for light bulbs (with respect to lamps)?  What type of good are light bulbs? (Hint: to find the cross-price elasticity of demand for light bulbs with respect to lamps use the point elasticity formula but modify it to consider the relationship between the price of lamps and the quantity of light bulbs rather than the relationship between the price of light bulbs and the quantity of light bulbs.)

<span style="color:red">Equations take the form of :Q = b -X(Price of Light Bulbs)+/- Y(Price of Lamps) +/- Z(Income)
a.  Z*(I/Q).  If your Z is negative, then this is an inferior good.  If your Z is positive, this is a normal good.
b. Y*(Price of Light Bulbs/Q).  If your Y is negative, then these goods are complements, if your Y is positive, these goods are substitutes.</span>

5) Use the following information to answer the next **four** questions:

The following table gives cost information for a firm.  Assume that labor is paid a constant wage, i.e. our firm is a price-taker in the labor market.

| L | K | Q | MPL | VC | FC | TC | AVC | AFC | ATC | MC |
|---|---|---|-----|----|----|----|-----|-----|-----|----|
| 0 | 6 | 0 | --- | 0 | 12 | 12 | --- | --- | --- | --- |
| 1 | 6 | 1 | 1 | 4 | 12 | 16 | 4 | 12 | 16 | 4 |
| 2 | 6 | 3 | 2 | 8 | 12 | 20 | 2.66 | 4 | 6.66 | 2 |
| 3 | 6 | 10 | 7 | 12 | 12 | 24 | 1.2 | 1.2 | 2.4 | .57 |
| 4 | 6 | 15 | 5 | 16 | 12 | 28 | 1.06 | .8 | 1.87 | .8 |
| 5 | 6 | 17 | 2 | 20 | 12 | 32 | 1.17 | .7 | 1.88 | 2 |
| 6 | 6 | 18 | 1 | 24 | 12 | 36 | 1.33 | .66 | 2 | 4 |

    a)  Complete the table with specific values.
    b)  Suppose output is equal to zero. Why does the firm still incur costs in the short run when output is equal to zero? What is the fixed cost of this firm? What is the price of a unit of capital?  <span style="color:red">The firm still has to pay for the 6 units of capital they have invested in, their fixed cost.  This costs them $12, as captial appears to cost $2/unit.</span>
    c)  What is the wage rate?  <span style="color:red">The wage rate is $4/worker.</span>
    d)  At what level of labor usage does the law of diminishing returns first occur?  <span style="color:red">The law of diiminishing returns first appears at the 4th unit of labor hired.</span>

6) Johnny Joe's is a burrito store that wants to raise their total revenue.  The staff can identify customers as freshmen or upperclassmen, but other than that they all look the same.  Currently all burritos are $6 each.  Johnny Joe's is thinking of changing the price to $3 per burrito.  Having studied the market for burritos, Johnny Joe knows how consumers are likely to respond to the price change and has provided you this information in the table below:

| Price | Quantity demanded by Freshmen | Quantity demanded by Upperclassmen |
|---|---|---|
| $6 | 300 | 300 |
| $3 | 900 | 360 |

a)  What is the price elasticity of demand for each of these groups, using the midpoint method?
   Price elasticity is 3/2 for Freshmen and it is 3/11 for Upperclassmen.

b)  What is Johnny Joe's total revenue at the current price of $6/burrito?  What is Johnny Joe's total revenue at a price of $3/burrito?
   Current total revenue is $3,600.  Total revenue is $3,780 if they drop prices to $3/burrito.

c)  What is Johnny Joe's total revenue if they charge upperclassmen $3/burrito and they charge freshmen $6/burrito?    What is Johnny Joe's total revenue if they charge upperclassmen $6/burrito and they charge freshmen $3/burrito?
   If Freshmen pay $6/burrito and Upperclassmen pay $3/burrito then revenue is 3*360 + 6*300 = $2,880. If the opposite plan is undertaken, the total revenue is 3*900 + 6*300=$4,500.

d)  Which of the pricing schemes considered yielded the highest total revenue?    Explain why this is best pricing scheme for Johnny Joe's to use in order to maximize total revenue.  The best pricing scheme charges Upperclassmen $6/burrito and Freshmen $3/burrito.  This is because between the prices of $3 and $6, Upperclassmen demand is inelastic (3/11), meaning that raising prices on them will increase total revenue.  On the other hand, elasticity of demand is elastic (3/2) for Freshmen between $3 - $6, meaning that lowering prices will increase total revenue amongst that segment.  As such, we want lower prices on Freshmen ($3) and higher prices ($6) on Upperclassmen in order to maximize revenue.


7)  Bret Bielema only eats beef jerky.  In his first year as UW Head Coach, Slim Tims cost $1 apiece, while Jack Winks were $2 each.  That year, Coach Bielema ate 1,000 Slim Tims.  In his second year as Head Coach, Slim Tims cost $2 each, while Jack Winks were only $1 each.  That year Coach Bielema ate 1,000 Jack Winks.

a) Compute a price index for beef jerky for each year - the basket should include 2 Slim Tims and 2 Jack Winks. Assume Coach Bielema's first year as coach is the 'base year'. How does the index change from one year to the next?
   The cost of the market basket in the first year is $6 and the cost of the market basket in the second year is also $6. To find the price index in the first year divide the cost of the market basket in year 1 by the cost of the market basket in the base year and multiply this value by 100 in order to measure the price index on a 100 point scale. Thus, price index for year 1 is equal to ($6/$6)(100) = 100. The price index for year 2 is given by the cost of the market basket in year 2 divided by the cost of the market basket in the base year times the scale factor: thus, price index in year 2 with year 1 the base year = ($6/$6)(100) = 100. The index does not change from the first year to the second year because the cost of the market basket does not change over this period of time.

b) Compute Coach Bielema's nominal spending on beef jerky each year.  How does it change from year to year?  Coach Bielema's nominal spending on beef jerky in the first year is equal to (price of Slim Tims)(# of Slim Tims consumed) = ($1/Slim Tim)(1000

c) Compute Coach Bielema's real spending on beef jerky each year. How does it change over time? In the base year the nominal value is equal to the real value. Thus, the real spending on beef jerky in the first year must equal $1000. In the second year, the real spending on beef jerky is equal to his (nominal spending divided by the price index)(the scale factor) or ($1000/100)(100) = $1000. His real spending is the same as his nominal spending for both years.

8)
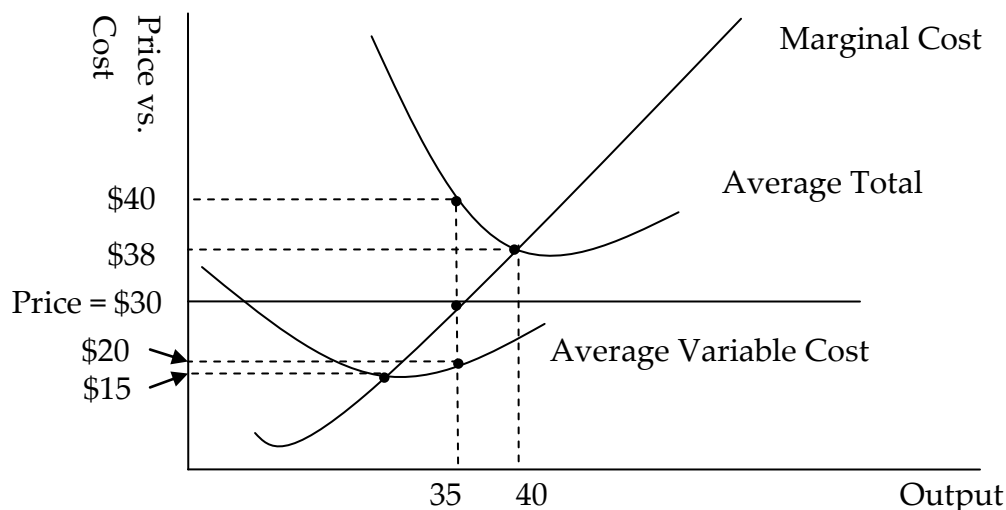


The following graph shows the production cost curves of a firm in a perfectly competitive industry. Assume that the firm is a price-taker and the equilibrium price equals $30 in the short run. (Hint: According to the graph, we can tell the firms are producing 35 units of the good.)

(1) In the short run, how much is the Total Cost for this company at the profit maximizing level of output? Total cost is equal to average total cost (ATC)*Q. At the profit maximizing level of output, where Price = Marginal Cost (Q = 35), the total cost = 40*35 = $1,400.

(2) In the short run, will the firm make a positive economic profit or a negative economic profit? Calculate the value of profits for this firm in the short run. Will the firm continue to operate in the short run or will it shut down? In the short run the firm will make a loss. That is because total costs ($1,400) exceed total revenue (35*30 = $1,050). Still, the firm is making more than their variable costs (VC = 35*20 = $700), so they will remain open in the short run.

(3) Given the information above, calculate the fixed cost of production for this firm. Then, calculate the variable cost of production if the firm produces 35 units of the good. Finally, calculate the variable cost of production if the firm produces 40 units of the good. Fixed costs are equal to AFC * Q. AFC = ATC - AVC. Calculate this at any quantity, though 35 is a logical one here. AFC = $20. Thus, FC = 20*35 = $700. As above, at Q=35, VC = $700. At a quantity of 40 units, we need to use what is given on the graph to get the answer for VC.

We are shown that ATC = $38 at Q=40. That means that TC = $1,520, of which $700 is still fixed, meaning that $820 is the variable cost at Q = 40.

(4) What is the break-even price for the firm given the above graph? What is the shut-down price for the firm given the above graph? The break-even price for the firm is $38, the shutdown price is $15.