**Economics 101**
**Fall 2010**
**Homework #3**
**Due 10/26/10**

**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!

1. Luckland is a small economy and its economic activity is assumed to not affect world prices. The world price of blueberries is 10 dollars per box. The domestic supply and demand curves for blueberries in Luckland are given by:

Supply: $Q = 60 + 20P$
Demand: $Q = 1160 - 15P$

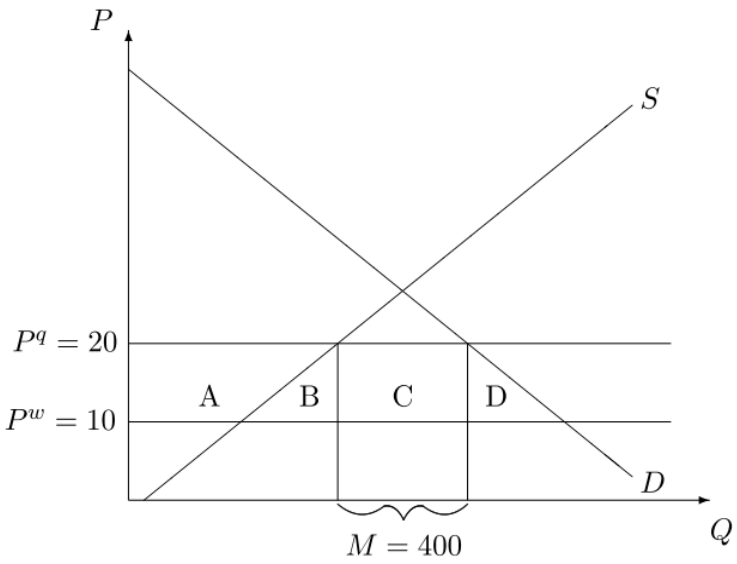
(a) Assume Luckland's economy is completely open to trade. Find the equilibrium price and quantity in Luckland's market for blueberries. How many boxes of blueberries are produced domestically and how many boxes of blueberries are imported?

Key: Since the economy is open to international trade, the equilibrium price is determined by the world price. Therefore, using the domestic supply and demand equations, and recognizing that the amount of imports is given by $1100 - 35P$, we get:
Domestic demand: $1160 - 15 \times 10 = 1010$
Domestic supply: $60 + 20 \times 10 = 260$
Imports: $1100 - 35 \times 10 = 750$

(b) Now the government of Luckland implements an import quota of 400 boxes of blueberries. What happens to the price and quantity of blueberries consumed in Luckland's market?

Key: The effect of the import quota is to limit the amount of imports at exactly 400 boxes of blueberries. Therefore, using the import demand equation expressed above, we can solve for the new equilibrium price to be:
$400 = 1100 - 35P * P = 20$
Given this higher price, we get:
Domestic demand: $1160 - 15 \times 20 = 860$
Domestic supply: $60 + 20 \times 20 = 460$
So, we can check that Luckland indeed imports 400 boxes. $860 - 460 = 400$

(c) Calculate the changes in domestic consumer surplus and domestic producer surplus caused by the implementation of the quota described in part (b) relative to the levels of consumer surplus and producer surplus when the economy is open to trade. What's the license holder revenue and deadweight loss associated with this policy?




Key: From the above figure, the welfare affects caused by the quota are clear.
The restricted imports allow domestic producers to sell more at a higher price of $20/box. Therefore, domestic producer surplus increases by area A. Domestic consumers have to pay the higher price, so domestic consumer surplus falls by the areas A,B,C, and D. The license holder revenue comes from selling the quota licenses. And the revenue is represented by area C. The deadweight loss is represented by areas B and D.
Calculating the areas for each, we have:
The change in domestic producers surplus = area A = (20 – 10)(260) + (1/2)(20 – 10)(460 – 260) = $3600
Deadweight loss due to the imposition of the quota = area (B + D) = (1/2) × (460 – 260) × (20 – 10) + (1/2) × (1010 – 860) × (20 – 10) = $1750
License Holder Revenue = area C = 400 × (20 – 10) = $4000
A + B + C + D = $9350

(d) From the domestic consumers' perspective, which trade policy—closed economy, open economy, or open economy with a quota—would they prefer? Which of the policies do the domestic producers prefer? Explain your answer.

Key: The world price is less than the closed economy equilibrium price. In this situation, domestic consumer surplus is greatest when the trade policy is the one of an open economy. Domestic consumers rank these choices from best to worst in this order: open economy, open economy with a quota, closed economy. And domestic

producer surplus is greatest when the trade policy is the one of a closed economy. Domestic producers rank these choices from best to worst in this order: closed economy, open economy with a quota, open economy.

(e) Luckland is considering replacing the import quota on blueberries with a tariff. If domestic consumer surplus and domestic producer surplus are to remain the same with the tariff as they are with the quota, what is the amount of the tariff?

Key: In order to implement a tariff with the same effects as this quota, the government just needs to make sure that the economy moves from the initial trade free equilibrium to the same new equilibrium after introducing either policy. Then the effects on domestic consumers and producers will be exactly the same under either policy. It means that the tariff has to raise the price to equal the equilibrium price with the quota.
Tariff: 20 – 10 = 10

2. Consider the market for cheesecake. The supply and demand curves are given by:
Supply: $P = Q + 2$
Demand: $P = 10 - (1/3)Q$

(a) Find the equilibrium price and quantity in the market for cheesecake.

Key: $Q + 2 = 10 - (1/3)Q$
$Q = 6$
$P = 8$

(b) Find the price elasticity of demand and price elasticity of supply for cheesecake at the equilibrium. Use the point elasticity method for this calculation.

Key:
The price elasticity of demand = $(-1/\text{slope})(P/Q) = (3)(8/6) = 4$. Note that the term (1/slope) includes the negative so that the price elasticity of demand will generate a positive value. This reflects the fact that demand curves are generally downward sloping so that an increase in the price of the good typically results in a decrease in the quantity demanded of the good.

The price elasticity of supply = $(1/\text{slope})(P/Q)$ . Note you do not need the negative sign in the term (1/slope) in the case of price elasticity of supply since supply curves are generally positively sloped and therefore an increase in the price of the good causes an increase in the quantity supplied of the good. Thus, price elasticity of supply in this case is equal to $(1)(8/6) = 4/3 = 1.33$.

(c) Without doing any calculations – Is demand elastic, inelastic or unit elastic at a price of $4?

Key: A linear demand curve should be elastic at any point above the midpoint price and inelastic at any point below the midpoint price. For this demand curve, the midpoint price is $5. Therefore, without doing any calculations we know that demand has to be inelastic at a price of $4.

(d) Use the arc elasticity formula (midpoint method) to calculate the price elasticity of demand between prices of $2 and $4. Is demand elastic or inelastic in this portion of the demand curve?

Key: On this portion of the demand curve, the demand curve is inelastic.

$$\left|\frac{\left(\frac{Q_D^1 - Q_D^0}{\overline{Q}}\right)}{\left(\frac{P^1 - P^0}{\overline{P}}\right)}\right| = \left|\frac{\left(\frac{24-18}{21}\right)}{\left(\frac{2-4}{3}\right)}\right| = \frac{\left(\frac{3}{21}\right)}{\left(\frac{1}{3}\right)} = \frac{9}{21} = \frac{3}{7}$$

(e) Use the arc elasticity formula (midpoint method) to calculate the price elasticity of demand between prices $6 and $8. Is demand elastic or inelastic in this portion of the demand curve?

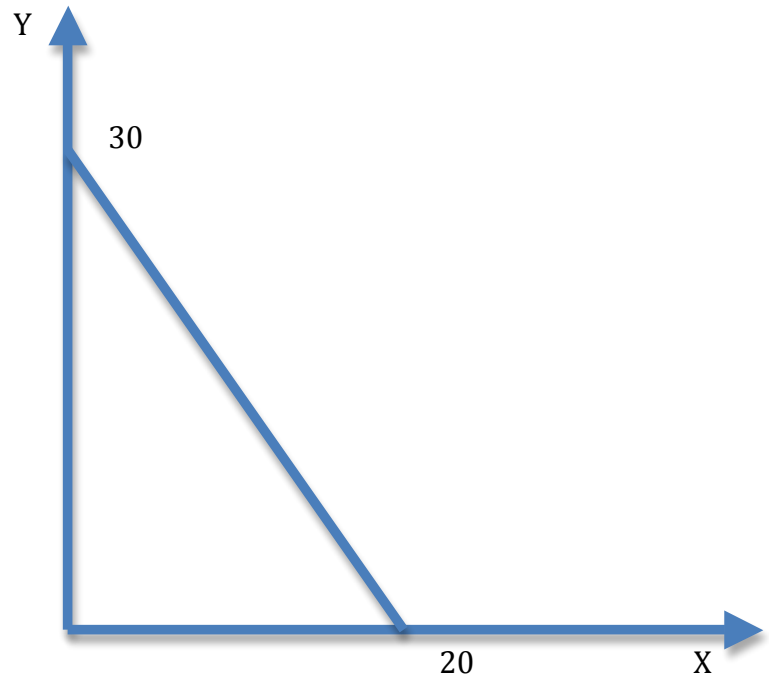
Key: In this portion of the demand curve, the demand curve is elastic.

The price elasticity of demand = the absolute value of {[(6 – 12)/6 + 12)]/(8 – 6)/(8 + 6)]} = ([6/18]/[2/14]} = (1/3)/1/7) = 7/3 = 2.33

3. Suppose Blair consumes two goods, good X and good Y. Good X costs $3 each and Good Y costs $2 each. Blair's income to spend on good X and good Y is $60.

(a) Draw Blair's budget line on a graph and label this budget line BL1. Measure good Y on the y-axis and good X on the x-axis. Include the numerical value of the y-intercept and x-intercept. What is the equation for Blair's budget constraint?

Key: The equation is 3X+2Y=60. The y-intercept =30 when X=0, and x-intercept =20 when Y=0.

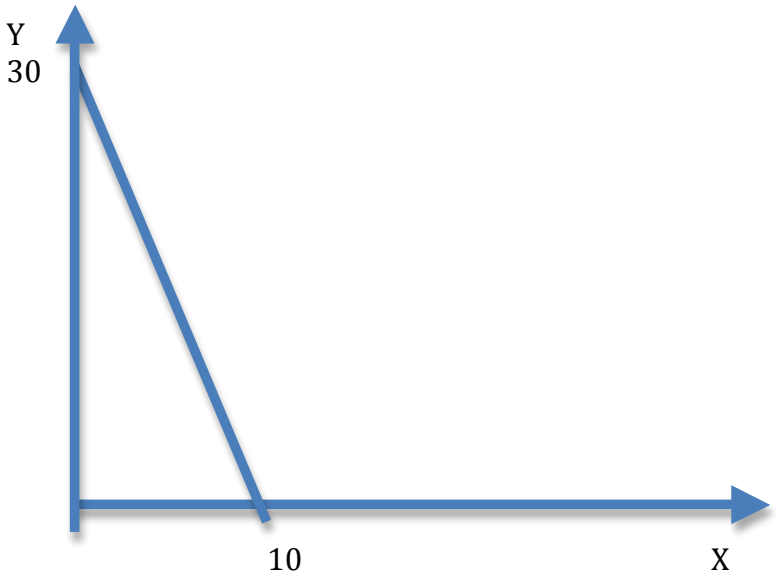



(b) Suppose Blair consumes both X and Y, what must her marginal rate of substitution of good X for good Y be at her optimal consumption bundle?

Key: MRS = Px/Py = 3/2.

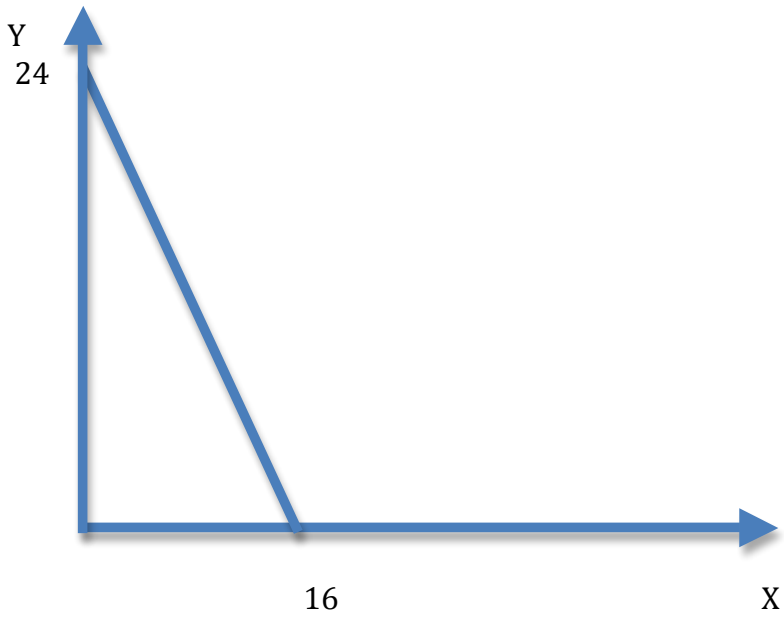
(c) Suppose the price of good X doubles while the price of good Y and Blair's income are unchanged. Draw Blair's new budget line, BL2, on your graph. What is the new equation for the budget line?

Key: The new budget line is given by the equation I = PxX + PyY or 60 = 6X + 2Y. Rewrite this as Y = 30 – (3)X to have the equation in slope-intercept form.



(d) Suppose Blair's income decreases to $48 and prices are the same as in part (a). What is the slope-intercept form for this new budget line, BL3?

Key: The new equation is 3X+2Y = 48. Slope-intercept form is Y = 24 – (3/2)X.




(e) Now suppose that there is a serious inflation that causes the price of everything (both prices and income) to double from their original levels. What will happen to her optimal consumption bundle? (Describe it in terms of real and nominal prices.)

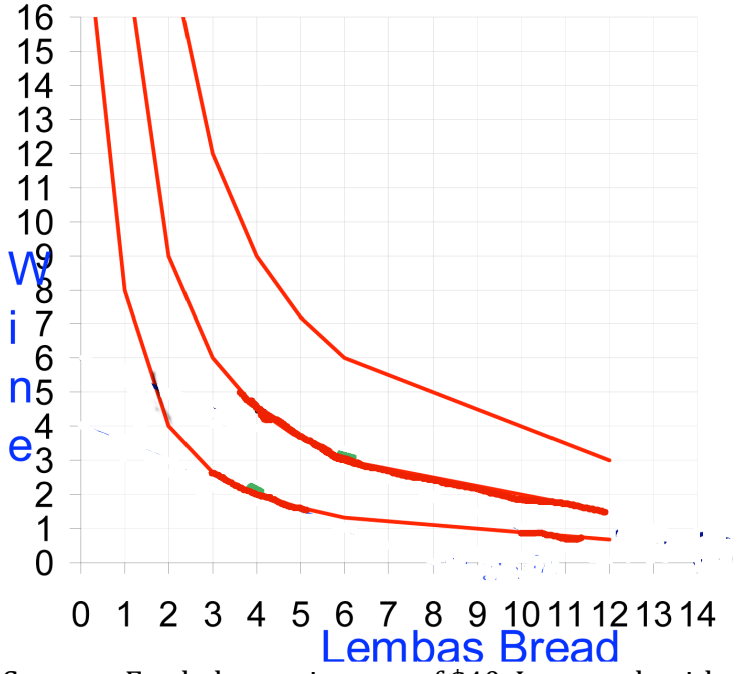
Key: The new budget constraint is 6X+4Y=96, which is equivalent to 3X+2=48. Therefore, her optimal consumption does not change. There has been a change in nominal prices and nominal income, but real prices and real income have remained unchanged.

(f) Prices and Income are the same as in part (a). Which of the following combinations can Blair afford?

(1) 6 X and 22 Y.
(2) 10 X and 13 Y.
(3) 12 X and 12 Y.

Key:
(1) 3*6+2*22=62>60, cannot afford.
(2) 3*10+2*13=56<60, can afford.
(3) 3*12+2*12=60, can afford.

4. Frodo eats lembas and wine. His indifference curves are illustrated in the graph below. Suppose the prices of lembas and wine are Pl=$5 and Pw=$10.




(a) Suppose Frodo has an income of $40. In a graph with wine of the y-axis draw in Frodo's budget constraint and label it "BC(I=40)". What is the slope of this budget constraint?

Key: The budget constraint is 5l+4w=40 and the slope of the budget constraint = -0.5.

(b) At this income and given Frodo's indifference curve map, what is Frodo's optimal consumption bundle?

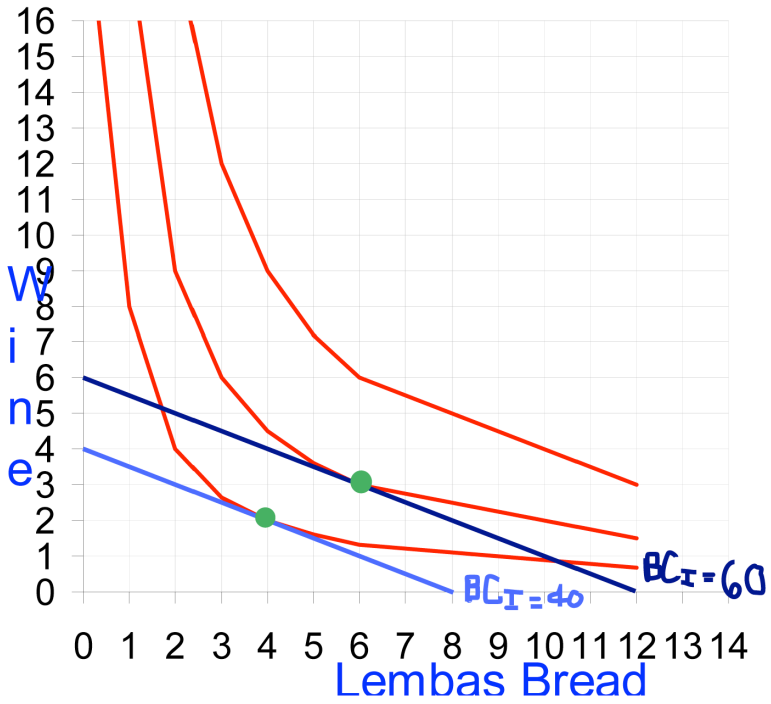
The optimal bundle is (4 bread and 2 wines).

(c) What's the marginal rate of substitution at the optimal consumption bundle?

Key: 0.5.
With this type of Indifference Curve, at the optimal consumption bundle, the absolute value of the slope of the Indifference Curve (MRS) is the same as the absolute value of the budget constraint.

(d) Suppose prices remain the same but Frodo's income increase to $60. Illustrate the new budget constraint, BC(I = 60) on your graph. What is the new optimal consumption of lembas bread and wine for Frodo given his new budget constraint and his indifference curve map?

Key: 6 bread and 3 wines




(e) From comparing your answers in part (b) and part (d), can you determine whether Frodo considers wine a normal good and lembas an inferior good? Explain your answer.

Key: As income increases from $40 to $60, consumption of both goods increases. Thus, both goods are normal.

(f) If there are only two goods that Frodo consumes, is it possible for both goods to be inferior?

No.

5. Ted loves skiing and wants to go as often as he can afford to. For each day he skis, he needs to rent skis and buy a lift pass. Ski rentals are $10 a day and lift passes are $40 a day. He has $200 to spend on skiing this winter.

(a) Draw Ted's budget constraint for the number of ski rental days and the number of lift pass days on a graph. In your graph, measure ski rentals on the horizontal axis and lift tickets on the vertical axis. What is his optimal consumption bundle? (Hint: you will need to think about what Ted's indifference curves look like to answer this last question.)

Key: One bundle of (1 ski rental, 1 lift ticket) costs $50. Ted can afford 4 of these bundles. Ted's optimal consumption bundle is (4 ski rentals, 4 lift tickets).

(b) Illustrate his optimal consumption bundle and draw Ted's indifference curve through it on your graph.

(c) Draw his indifference curve that includes the consumption bundle (2 ski rentals, 2 lift tickets) and draw his indifference curve that includes the consumption bundle (6 ski rentals, 6 lift tickets) on your graph. Label these indifference curves clearly.