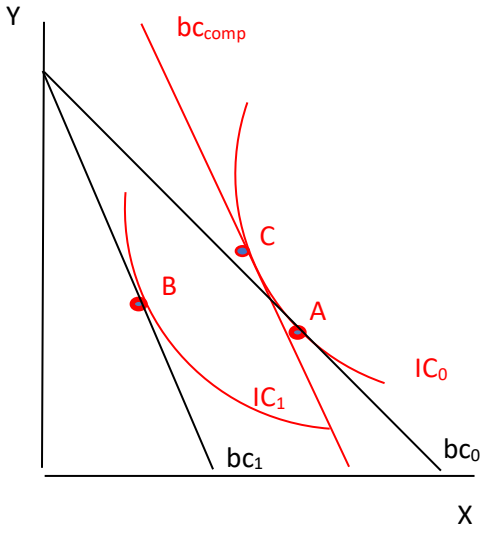
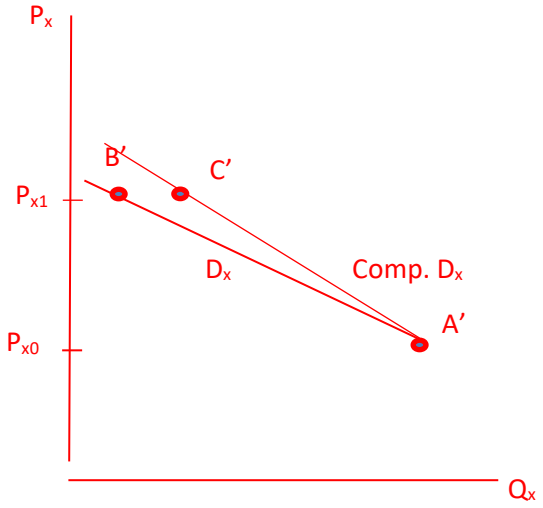
Problem Set #4
ECNS 204
Snowmester 2020

1.) a.) Suppose X is a normal good. Show this in the diagram below by drawing indifference curves tangent to the budget constraints and including the compensated budget line. In the space to the right, draw a separate diagram illustrating the compensated demand curve for good X and the standard demand curve for good X. Is the compensated demand curve steeper in slope or shallower in slope then the standard demand curve?





Compensated demand curve is steeper in slope than standard demand curve

b.) Now, instead of assuming X is normal, assume X is inferior. Under this assumption, is the compensated demand curve for X steeper in slope or shallower in slope than the standard demand curve? Support your answer with two graphs: an indifference curve + budget constraint diagram for an inferior good; a graph illustrating the compensated demand curve for X and the standard demand curve for good X.

Here, point B needs to be drawn to the right of point C. As a result, the compensated demand curve when X is inferior is going to be shallower than the standard demand curve.

2.) Suppose Alfred earns $10/hr. and at this wage he chooses to work 10 hrs./day. Now, suppose that Alfred has received a raise to $15/hr. Will Alfred choose to work more or fewer hours per day under this higher wage rate? Or, given this information, is it not possible to tell whether he will work more or less? What does your answer depend on?

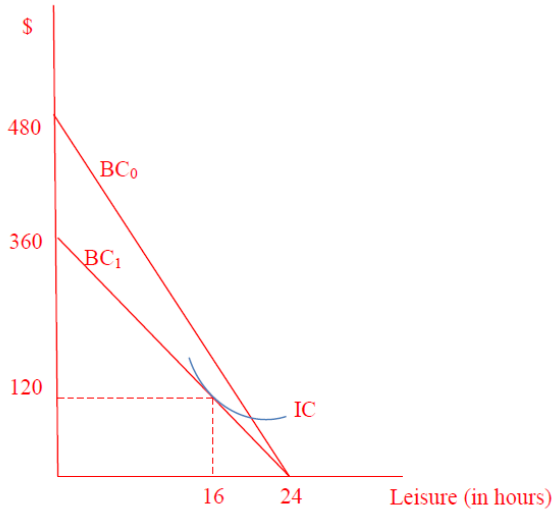
Support your answer with an indifference curve and budget constraint analysis.

Your graph should show the standard income and substitution effects.

We do not know whether Alfred will work more or fewer hours under the higher wage rate. The answer depends on the relative magnitudes of the income and substitution effects.

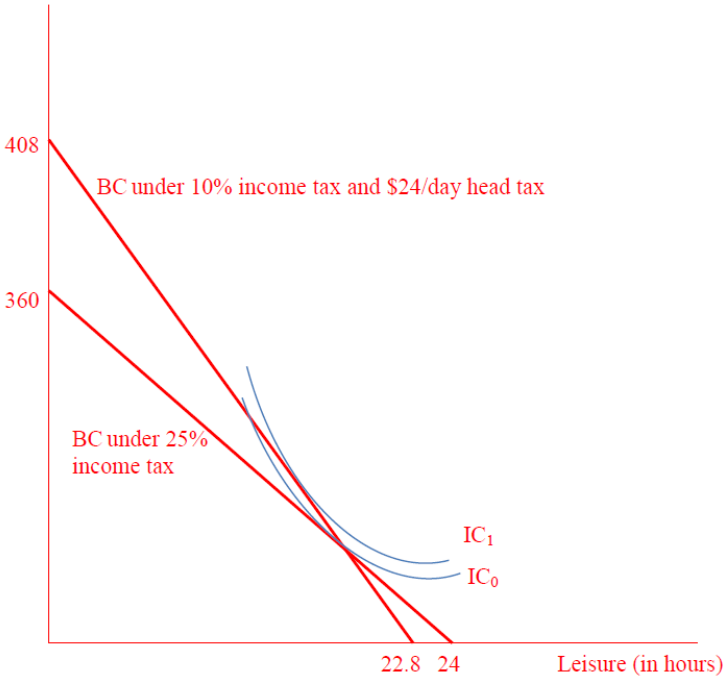
3.) Suppose Jay earns $20 per hour at his job. Also suppose that the government has imposed an income tax of 25% and that Jay has decided to work 8 hours per day under this tax scheme.

a.) Draw a graph with two budget constraints for Jay. One under the assumption of no tax and the other under the income tax scheme described above. Also draw the indifference curve that shows Jay's optimum leisure/income combo under the income tax scenario. Make sure to label your graph! This includes the points of intersection between the budget constraints and the vertical and horizontal axes and the point of tangency between the IC and budget constraint.



b.) Now suppose that the government has decided to decrease the income tax to 10%, but to add a head tax of $24 per day. The income tax is imposed on Jay's pre-head tax income. Which tax regime does Jay prefer? The income tax of 25% from part a.) or the income tax of 10% plus a $24 per-day head tax? Support your answer with a graphical analysis. Again, label your graph or you will lose points. (Hint: Think about drawing the income tax + head tax budget constraint in two steps. First, consider how the 10%

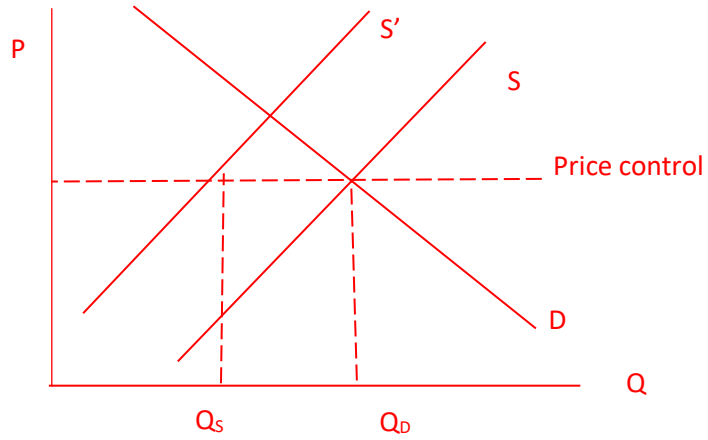
income tax changes Jay's budget constraint. Then, consider how the head tax changes the budget constraint that would exist if only a 10% income tax were imposed).



Because IC_1 is higher than IC_0, clearly the preferred tax is the 10% income tax plus the $24/day head tax.

4.) Suppose a freeze in Florida destroys a citrus crop. In response, the government has issued a ruling that forbids sellers from raising prices on their citrus fruit (i.e., the government has enacted a price control in this market).

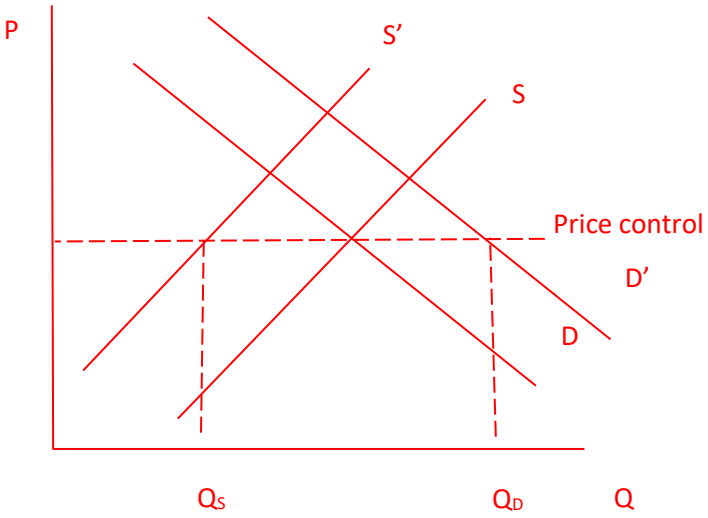
a.) Illustrate graphically how this causes a shortage in the market for citrus.



$Q_D > Q_S$

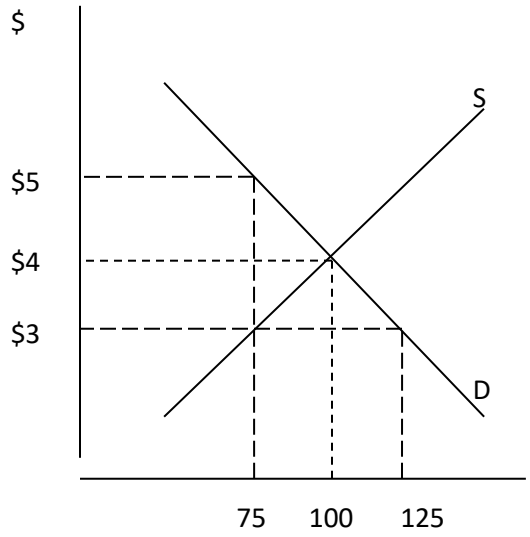
Thus, we have a shortage.

b.) Suppose that new information comes out on the health benefits associated with eating citrus fruit. As a result, the demand for citrus fruit goes up. Despite this change in demand, the government still decides to maintain the price control imposed in part a.). How is the market for citrus further affected by this change? Show with a graph.



The shortage simply gets larger.

5.) Suppose in an unrestricted market for gasoline that the equilibrium price is $4.00/gallon and the equilibrium quantity is 100 gallons. Now suppose the government has enforced a price control of $3.00/gallon. This is depicted in the graph below:



a.) How much of a shortage does the price control create in the gas market?

$Q_D - Q_S = 125\text{-}75 = 50$ gallons

b.) Suppose the average consumer fills their car up with 15 gallons of gas each time they go to the pump. Also, suppose the average consumer earns a $20/hour wage. Under the price control, how long would the average consumer be willing to wait in line to fill their tank up with 15 gallons of gas?

We see that the consumer who is lucky enough to fill his/her tank up with gas is essentially receiving a $2/gallon "gift." Given that filling up their tank requires 15 gallons of gas, then their total "gift" is $30 per each fill up. So, since the opportunity cost of the average consumer's time is $20/hour, this implies the average consumer would be willing to wait in line for up to 1.5 hours.

6.) How is it that the quantity demanded of some good can change even though there has been no change in demand? Can the quantity supplied change even though there has been no change in supply? (Silberberg and Ellis, Ch. 5, #2).

When the price of the good in question changes, the changes in the quantity supplied (demanded) are represented by movement along the supply (demand) curve. A change in demand or supply occurs when something other than the price of the good changes, particularly, income or the price of some closely related good changes.

7.) Why is it that *all* goods presently consumed by a consumer must initially be *normal* (i.e., noninferior in consumption)? That is, why is it that goods can be inferior *only at the margin*? (Silberberg and Ellis, Ch. 5, #4)

Goods that consumers are in fact consuming must initially be normal because otherwise they would never be consumed. Goods can be inferior only at the margin. If a good were inferior at a zero level of income, then the good would never be consumed.

8.) Many states do not levy a sales tax on professional services, e.g., the services of lawyers, doctors, accountants and the like. If you visit one of these professionals, they do not add a sales tax to their fee for services. (Silberberg and Ellis, Ch. 5., #16)

a.) Draw a supply and demand diagram that reasonably represents the market for, say, lawyers' services *in the short-run*, and explain why you have drawn the curves as you have. Pay particular attention to the slopes of the demand and supply curves, in particular, whether they appear flat or steep, and justify why you have drawn them as you have.

In the short run, the supply of professional services, say, lawyers, is relatively fixed and the supply curve is essentially vertical. It takes considerable time for an individual to become a lawyer. The demand for lawyer's services is relatively more elastic. There are substitutes for lawyer services (i.e., mediation or settling out of court as opposed to litigation).

b.) If a sales tax is levied on these services, who will pay most of the tax *in the short run* – clients or the lawyers?

In the short run, if a sales tax is levied on these services, lawyers, because their curve is relatively more inelastic, will pay most of the tax.

c.) How does the market for lawyers' services and the shares of tax paid by the lawyers versus their clients respond *in the long run* to this imposition of taxes?

In the long run, the supply of professional services will be more elastic because there will be more lawyers entering the labor force and offering their services. As a consequence, the burden of the tax will be borne more equally by both clients and the lawyers.

9.) Aaron and Charlotte find themselves on a deserted island. The only two activities available are fishing and hunting rabbits. In a full day, Aaron can catch 4 fish or 2 rabbits; in the same time, Charlotte can catch 3 fish or 6 rabbits. Activities can be divided with no loss of efficiency. When left to their own devices, Aaron consumes 2 fish and Charlotte consumes 2 fish also. (Silberberg and Ellis, Ch. 6, #3)

a.) How many rabbits can each person consume acting alone?

Acting alone, Aaron can consume 1 rabbit and Charlotte can consume 2 rabbits.

b.) What are each individual's marginal costs of fishing and hunting rabbits?

For Aaron: the marginal cost of an additional fish is ½ of a rabbit; the marginal cost of an additional rabbit is 2 fish. For Charlotte: the marginal cost of an additional fish is 2 rabbits; the marginal cost of an additional rabbit is ½ of a fish.

c.) Explain how Aaron and Charlotte can improve their standard of living through specialization. If they decide to continue to consume 2 fish each, what is their gain from specialization and trade?

Aaron and Charlotte can improve their standard of living if Aaron specializes in fishing and Charlotte specializes in hunting. By doing so, after a day's work there will be a total of 4 fish and 6 rabbits caught. With reference to each individual's production/consumption schedule above, if they both consume 2 fish each, Aaron will consume 1 rabbit and Charlotte will consume 2 rabbits. There will be 3 rabbits leftover, the gains from specialization, that they can divide between themselves.

10.) Mutt and Jeff find themselves on a deserted island. The only two activities available are fishing and hunting rabbits. In a full day, Mutt can catch 8 rabbits or 16 fish; in the same time, Jeff can catch 8 rabbits or 4 fish. Activities can be divided with no loss of efficiency. When left to their own devices, Mutt consumes 6 rabbits and 4 fish, and Jeff consumes 2 rabbits and 3 fish.

Explain how Mutt and Jeff can improve their standard of living through specialization. That is, what are their gains from specialization? What role, if any, does one person's absolute advantage play in your analysis? Also, illustrate graphically the combined production possibility frontier along with the bundle of goods in the economy when they specialize and the bundle of goods without specialization. *Note: No graph, no points.*

For Mutt:
MC_{rabbit} = 2 fish
MC_{fish} = ½ rabbit

For Jeff:
MC_{rabbit} = ½ fish
MC_{fish} = 2 rabbits

11.) Why is it that in primary schools one teacher instructs a class for an entire day in such diverse subjects as spelling, arithmetic, geography, science, etc., whereas in secondary schools and in college, these topics are taught by specialists in each field. Why do you suppose primary schools are structured contrary to the gains from division of labor? (Silberberg and Ellis, Ch. 6, #7)

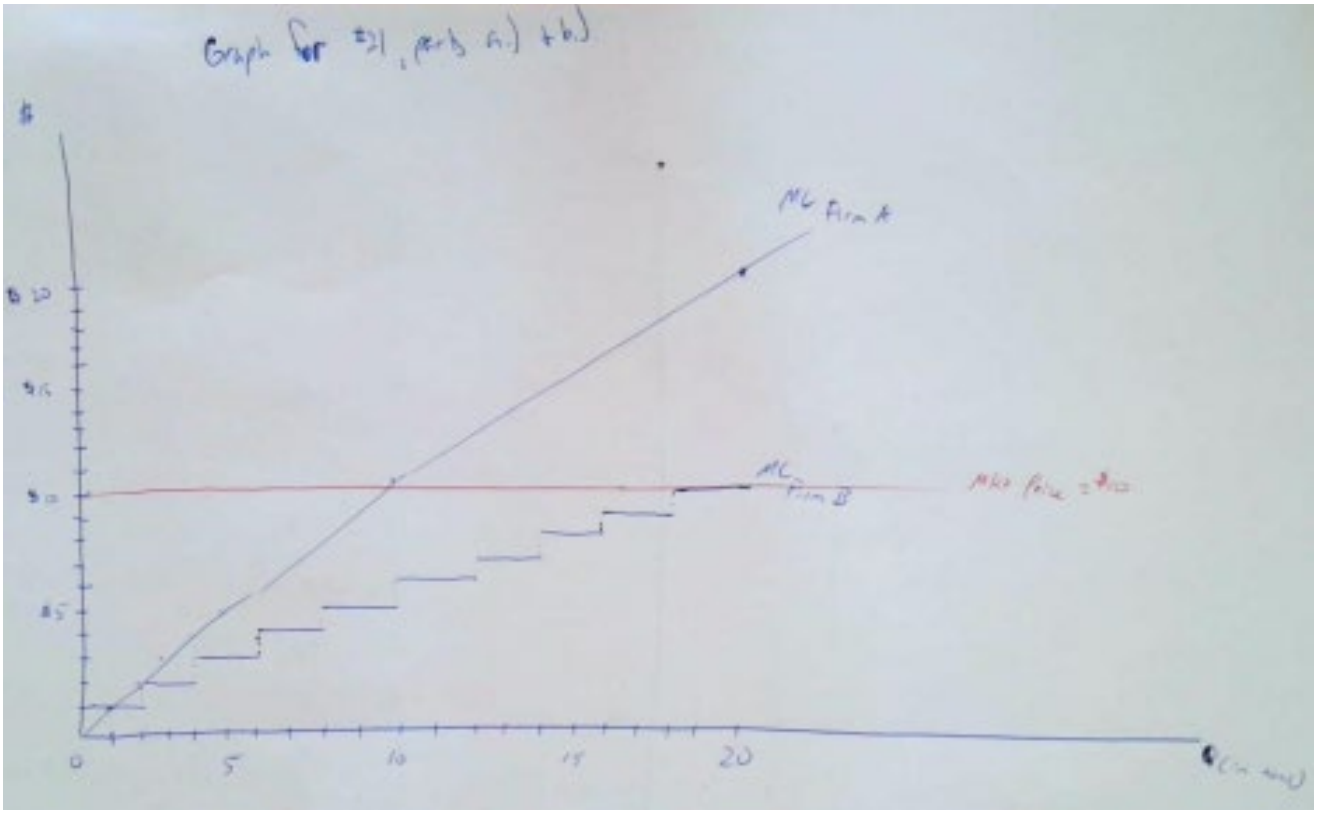
This probably has to do with the attention span of the primary school children, and elementary level of the material taught. At the primary level the material covered is usually not so difficult so that there is no significant loss of efficiency by having one instructor teach all subjects. One could argue, however, that elementary school teachers are themselves specialists in teaching young children basic education. The advantages of specialization in that task probably outweighs the gains from specializing in a subject at that level. Lastly, the costs of having primary children shuffle between subjects to different instructors as in secondary school would be considerable. Younger children are more easily distracted.

12.) California Sea Lions are protected by the Marine Mammal Protection Act. It is illegal to shoot or even to harass sea lions. In the Pacific Northwest, these animals have devasted salmon runs to the extent that certain subspecies of salmon are endangered. What fundamental principles of economics is illustrated by this policy? (Silberberg and Ellis, Ch. 6, #16)

This illustrates the trade-offs that must sometimes be made because of scarcity of resources. We have to decide which is more important at the margin, protecting sea lions or consuming more salmon.

13.) Consider two wood pulp firms with the following marginal cost schedules. Firm A produces the first ton of pulp at \$1 per ton, the 2nd ton at \$2/ton, the 3rd at \$3, etc., while firm B produces 2 tons of pulp at \$1 per ton, tons 3 and 4 at \$2 per ton and so forth. (Silberberg and Ellis, Ch. 6, #21). *Note: You need a graph for parts a. and b. of this problem (one graph can be used for both parts). No graph, no points.*

a.) If 30 tons of pulp are to be produced, what outputs at each plant would minimize the total cost of the pulp?
Firm A produces 10 tons and Firm B produces 20 tons



b.) Suppose the market price for pulp is \$10/ton. How much will each plant produce?
Answer is same as in part a.

c.) Suppose now, along with each ton of pulp produced, the firms produce a ton of pollutants, which decrease the value of the surrounding area by $2 per ton. What is the economically efficient level of output at each plant?

The pollution costs should be added to the private costs of production, result in MC curves that are shifted up by $2 each. Same as before…set the MCs equal to find the economically efficient level of production. Here, Firm A produces 8 and Firm B produces 16.

d.) Suppose the government simply ordered the firms to cut back pulp production to 3 tons each. Would that result in efficient use of resources? Explain.

No! MCs not equal at this point.