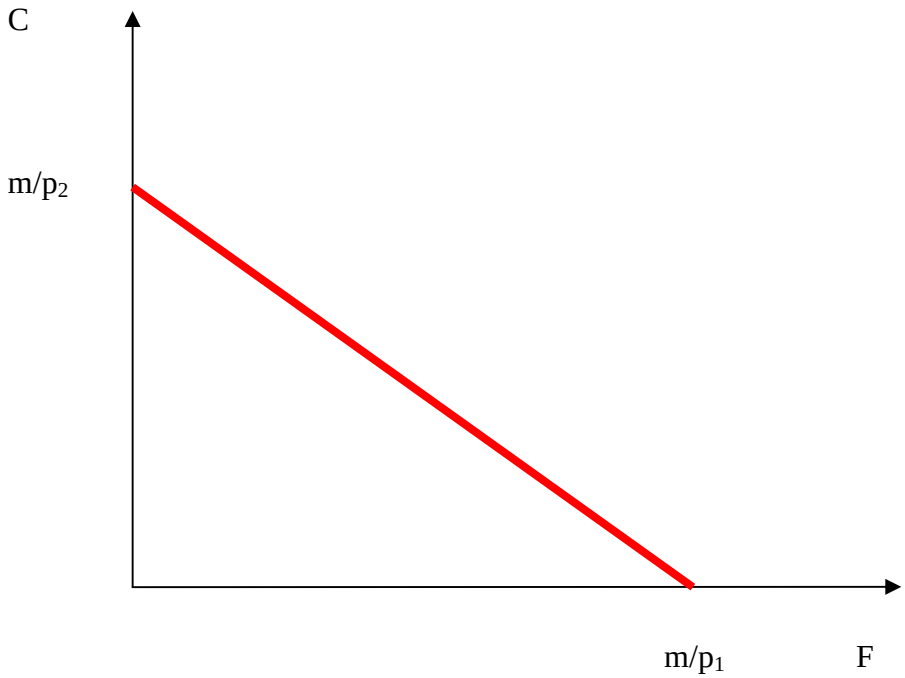
Problem Set #1 Econ21 – Summer 2007 *W. Gick*

*posted July 5, presentations in class July 11 of problems marked with an *.*

1. Solve the Workbook questions: #2.1, #2.2, #2.3, #2.5, #2.7, * #2.12

* 2. The following figure shows Bill's budget line for food (F) and all other goods (C).



Assume that p_2 is set to one and that the price for food is $2.5 . His initial budget is m = $ 200.

a) Would he spend all his money on food, how many units can he consume?

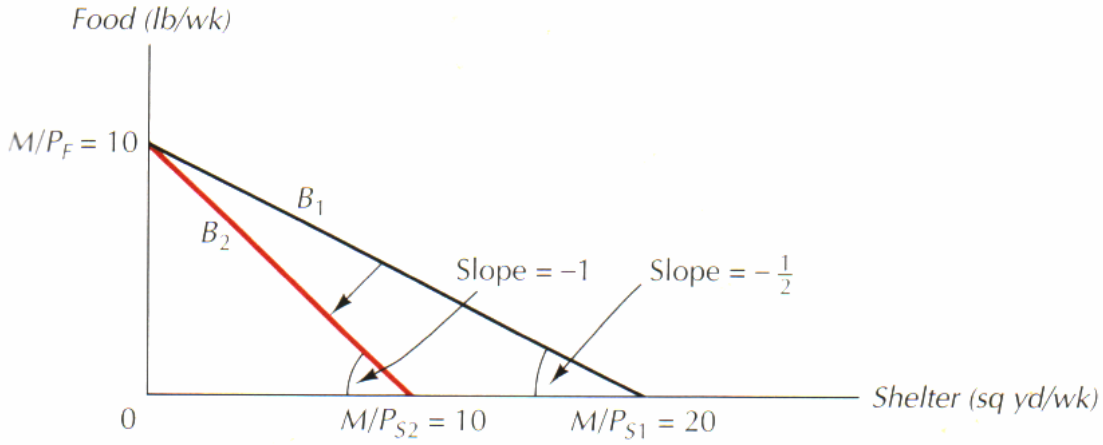
b) Assume now that Bill becomes eligible for the local food stamps program. This local program works as follows. Bill can buy food stamps for half the price, and for up to 30 units of food. Find Bill's new budget line if he buys food stamps for 30 units. Compute the coordinates of the "kink" in his budget line. How many units of food could he consume now if he would spend all his money on food?

c) Similar to the change in the U.S. in 1979, assume that the local food stamps program changes in that it gives Bill 25 food stamps for free that he can spend on 25 units of food. Assume that he is again eligible for the program: how many units of food could he consume now if he would spend all his money on food?

* 3. John lives in Ipswich and has the choice between using Amtrak (good 1) and his car (good 2). He pays a price per mile of p_1 when using the Amtrak, while being charged p_2 per mile when using his car.
a) Write down and graphically illustrate John's budget constraint.

b) Amtrak offers a frequent travel card charging a flat rate of b. Owners of this card can travel by only paying 50% of p_1 for each mile. Again graphically and mathematically illustrate the budget constraint.
c) Compute and graphically illustrate the mileage per year driven by train at which John would break even when buying the frequent travel card. Does the card increase John's budget set?

* 4. The following figure shows the effect of an increase in the price of shelter from $P_{S1} = \$5 / sq\ yd$ to $P_{S2} = \$10 / sq\ yd$.



a) Show the effect on the budget constraint B_1 of a fall in the price of shelter from $\$5 / sq\ yd$ to $\$4 / sq\ yd$.

b) Show the effect on the budget constraint B_1 of a rise in the price of food from $\$10 / lb$ to $\$20 / lb$.

* 5. The Connecticut River Power Company charges $ 0.10 per kilowatt-hour (kWh) for the first 1000 kWh of power purchased by any residential customer each month, but only $0.05/kWh for all additional kWh.

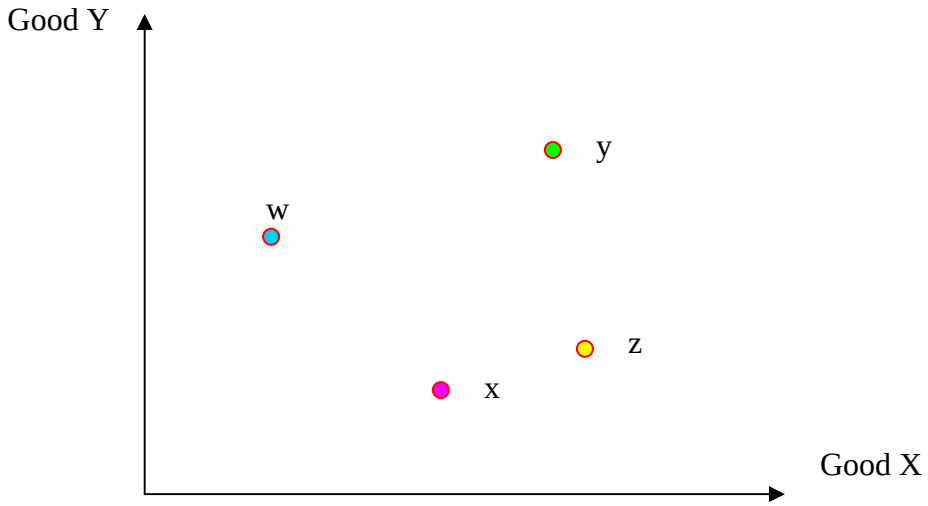
a) For a residential customer with a monthly income of $400, graph the budget constraint for electric power and the composite good.

b) Suppose instead that a different company, White River Electric, charged $0.05/kWh for the first 1000 kWh of power purchased by any residential customer each month, but $ 0.10 each for all additional kWh. For a residential customer with a monthly income of $400, graph the budget constraint for electric power and the composite good. What happens if the rate jumps to $ 0.10/kWh for *all* kWh if power consumption in a month exceeds 1,000 kWh (where the higher rate applies to all, not just to the additional, kWh)?

6. Solve the Workbook problems #3.1, #3.2, #3.3, * #3.4

* 7. We know the following about the preferences of a consumer who can freely choose between Good X and Good Y and has monotonic and convex preferences.

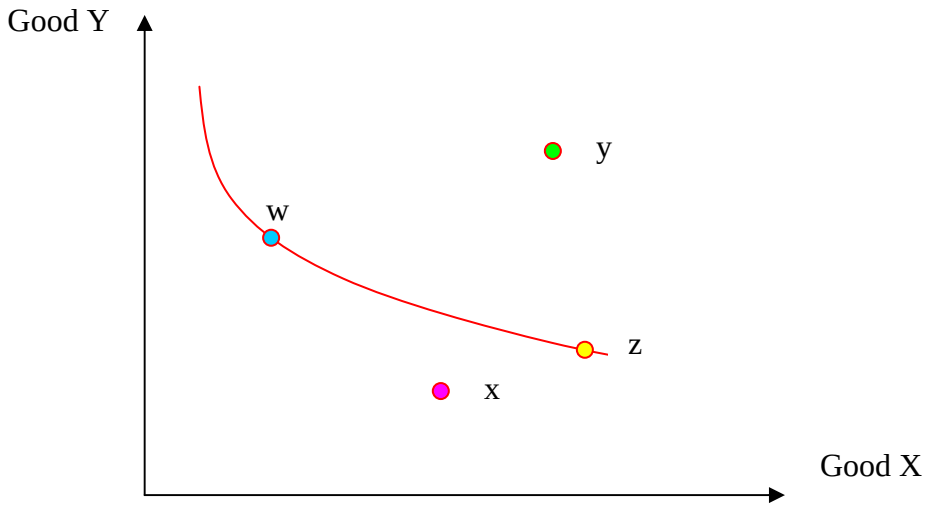
a) Follow the illustration below.



Mark whether the following statements are true (T), false (F), or if you cannot tell given the information in the diagram (C):

$w \underset{\sim}{\prec} x$	$x \underset{\sim}{\prec} w$	$y \underset{\sim}{\prec} w$
$w \underset{\sim}{\prec} y$	$x \underset{\sim}{\prec} y$	$y \underset{\sim}{\prec} x$
$w \underset{\sim}{\prec} z$	$x \underset{\sim}{\prec} z$	$y \underset{\sim}{\prec} z$
$w \underset{\sim}{\succ} x$	$x \underset{\sim}{\succ} w$	$y \underset{\sim}{\succ} w$
$w \underset{\sim}{\succ} y$	$x \underset{\sim}{\succ} y$	$y \underset{\sim}{\succ} x$
$w \underset{\sim}{\succ} z$	$x \underset{\sim}{\succ} z$	$y \underset{\sim}{\succ} z$

b) Now assume that bundle *w* and *z* are on the same indifference curve, as illustrated below:



Mark now behind each statement whether it is true (T) or false (F):

$w \underset{\sim}{\prec} x$	$x \underset{\sim}{\prec} w$	$y \underset{\sim}{\prec} w$	$w \prec z$
$w \underset{\sim}{\prec} y$	$x \underset{\sim}{\prec} y$	$y \underset{\sim}{\prec} x$	$z \succ w$
$w \underset{\sim}{\prec} z$	$x \underset{\sim}{\prec} z$	$y \underset{\sim}{\prec} z$	
$w \underset{\sim}{\succ} x$	$x \underset{\sim}{\succ} w$	$y \underset{\sim}{\succ} w$	
$w \underset{\sim}{\succ} y$	$x \underset{\sim}{\succ} y$	$y \underset{\sim}{\succ} x$	
$w \underset{\sim}{\succ} z$	$x \underset{\sim}{\succ} z$	$y \underset{\sim}{\succ} z$	

*8. Assume the Cobb-Douglas utility function of $u(x_1, x_2) = x_1^c x_2^d$.

a) Derive marginal utility.

b) Consider the monotonic transformation (see Varian ch.4) of the Cobb-Douglas function $v(x_1, x_2) = \ln u(x_1, x_2)$ and derive marginal utility for this function.

c) Show that deriving MRS from the function in (a) or in (b) leads to the same result.

9. Sketch the following indifference curves of an individual consuming two commodities: burgers and beer:

(a) Al loves beer and hates burgers. He always prefers beer, independent of the number of burgers he has.

(b) Betty is indifferent between two bundles that contain either 3 units of beer or 2 burgers. Her preferences do not change should she consume more of one of the goods in combination.

(c) Chris eats one burger, followed by one beer. He won't consume any unit of one good without a unit of the other good.

(d) Denise loves beer but is allergic to beef. For each burger consumed she's breaking out in a rash.

*10. Assume the utility that Karen is deriving from consuming the goods x_1 (delicatessen) and x_2 (apparel) can be described using $u(x_1, x_2) = x_1 x_2$.

(a) Draw the indifference curves using the utility levels 12 and 24. Are the indifference curves convex? Show why or why not.

(b) Karen has a budget of $ 120. One unit of delicatessen costs $ 10, one unit of apparel costs $ 30.

(c) Graphically determine the combination of delicatessen and apparel that maximizes Karen's utility.

(d) Find the MRS to this situation.

(e) Assume Karen decides to consume $x_1 = x_2 = 3$ while here budget is still $ 120. Is her MRS in absolute terms larger or smaller than $1/3$?

11. Solve the Workbook problems #4.0, #4.1, #4.2, * #4.4, *#4.9