OPMT 5701 Fall 2011

Assignment on Constraints

Name: Key SET:_____

1 Instructions

When working with constrained optimization problem, the most common problems that arise tend to be due to the constraints. This worksheet is to allow you to focus on just the constraints that arise in common business problems.

Below are three scenarios. In each case, you are to draw the budget constraints using all the information given. Put in as much detail as possible. Be neat an accurate and use a ruler.

This is a short assignment. It is due next week. Assume that there may be a short quiz in lecture based on this assignment.

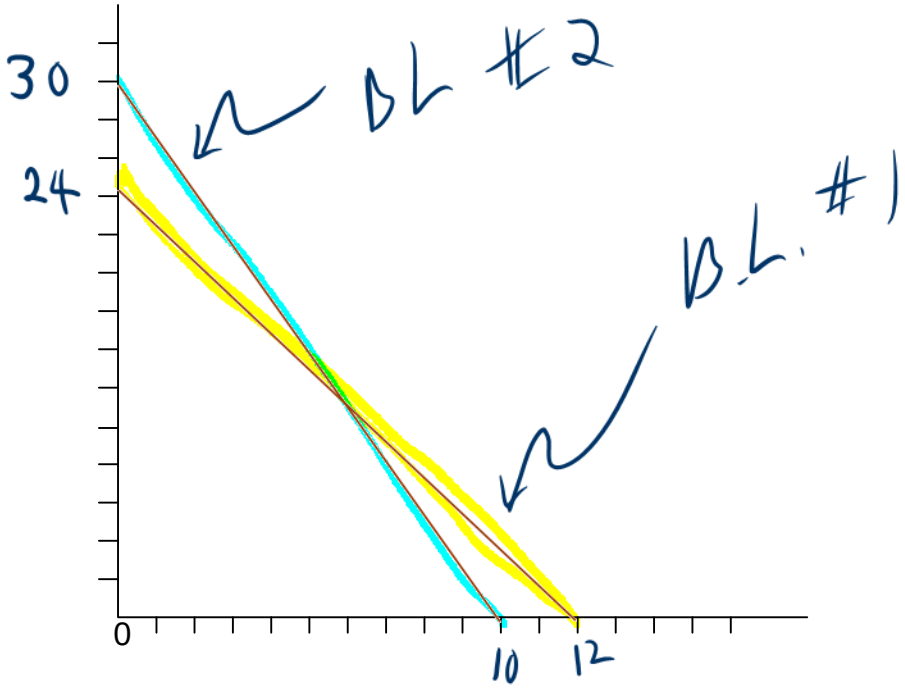
2 budget constraints

For most utility maximization problems, the constraint is in the form

$$B = P_x x + P_y y$$

1. Let the initial values be $B = 24, P_x = 2, P_y = 1$ write the budget constraint in slope-intercept form ($y = mx + b$) and plot it on the graph below.
2. suppose that $B = 30, P_x = 3, P_y = 1$. Write down the new budget constraint and add it to the graph below.
3. Solve for the point the two constraints cross. Label it on the graph

use: $Y = \frac{B}{P_y} - \frac{P_x}{P_y} X$



3 Intertemporal Budget Constraint

Let c_1 is consumption in period one and c_2 is consumption in period two. The consumer is also endowments of y_1 in period one and y_2 in period two.

Let r denote a market interest rate with the consumer can choose to borrow or lend across the two periods. The consumer's intertemporal budget constraint is

$$c_1 + \frac{c_2}{1+r} = y_1 + \frac{y_2}{1+r}$$

1. Suppose $y_1 = 30, y_2 = 20, r = 0.2$. Graph the budget constraint. Calculate and label both the horizontal and vertical intercepts.

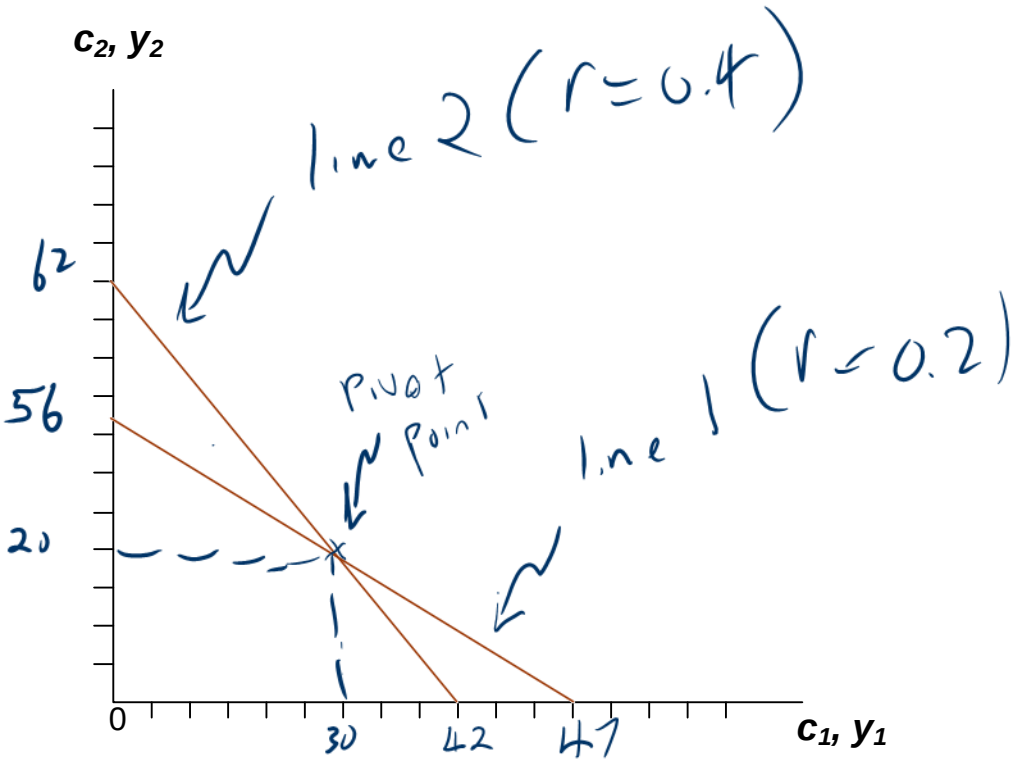
2. Label the point where the consumer would be if

   (a) his consumption equaled his income in each period.

   (b) his consumption in period one was $c_1 = 40$. What would be his consumption in period 2?

   (c) his consumption in period 2 was $c_2 = 30$. what would be his consumption in period 1?

3. Suppose the values were now$y_1 = 30, y_2 = 20, r = 0.4$. Write the budget constraint in slope-intercept form ($c_2 = a + bc_1$). add it to your graph. carefully label the intercepts. Does the new budget line cross the old budget line? If so, where?



4 Labour Supply Constraint

Skippy has 24 hours in a day. Skippy likes to consume a composite commodity (C) and leisure (L). If skippy works, she earns a wage of w. With the money she earns, Skippy buys C at a price of \$1 per unit. Her hours of work are denoted by H where $H = 24 - L$ per day. Her budget constraint is

$$\begin{aligned} C &= wH \\ C &= w(24 - L) \\ C &= 24w - wL \end{aligned}$$

1. If $w = 20$, draw her budget constraint and label the horizontal and vertical intercepts.
2. If the wage increases to $w = 30$ draw and label her budget constraint.
3. Suppose Skippy earns $w = 20$ for the first 8 hours then earns $w = 30$ for every hour after that. Draw her budget constraint to reflect this fact.
4. Suppose that Skippy receives a Lump Sum payment of ~~\$100~~ 200 each day. This means she can consume \$200 of C if she choses not to work at all. In addition, Skippy will earn $w = 20$ for each hour she works, therefore
   (a) Label the point where she consumes when hours of work are zero ($H = 0, L = 24$)
   (b) If Skippy choses to work, the money she earns is added to the \$200. Draw her budget line. Notice anything unusual about the horizontal intercept?