

## Problem set 4, due Monday 10/20/14

**1. The life cycle and labor supply.** Suppose that Carl's life can be divided into two distinct time periods, period 1 and period 2. Defining  $e_1$  as leisure in period 1,  $e_2$  as leisure in period 2, and  $c$  as total lifetime consumption, Carl's preferences can be represented by the utility function  $U = e_1 e_2 c$ . Suppose a simple budget constraint of  $c = (1 - e_1)w_1 + (1 - e_2)w_2 + k$ , where  $w_1$  is Carl's wage rate in period 1,  $w_2$  is Carl's wage rate in period 2, and  $k$  is Carl's non-labor income.

**a)** Find the functions  $c(w_1, w_2, k)$ ,  $e_1(w_1, w_2, k)$ , and  $e_2(w_1, w_2, k)$ , which give Carl's optimal consumption, period 1 leisure, and period 2 leisure, as they depend on both wage rates and non-labor income.

**b)** Find Carl's optimal  $c$ ,  $e_1$ , and  $e_2$  if  $w_1 = 100$ ,  $w_2 = 80$ , and  $k = 0$ .

**c)** Find Carl's optimal  $c$ ,  $e_1$ , and  $e_2$  if  $w_1 = 130$ ,  $w_2 = 80$ , and  $k = 0$ .

**d)** Comment on the effect of a period 1 wage increase on optimal lifetime consumption, and optimal leisure time in both periods.

**e)** Find Carl's optimal  $c$ ,  $e_1$ , and  $e_2$  if  $w_1 = 100$ ,  $w_2 = 20$ , and  $k = 0$ .

**2. Comparative advantage.** Pat and Chris are partners. In a given hour, Pat can either make \$24 at work, or do 4 chores around the house. Likewise, Chris can either make \$12 at work, or do 3 chores around the house.

**a)** Who has an absolute advantage in what?

**b)** Who has a comparative advantage in what?

**c)** What trades of money for household chores might be mutually beneficial for Pat and Chris?