due : Wednesday March 21   before class

Do all 5 questions. All count equally.

1. Suppose that the service sector uses only labour as an input (and no capital), and that 1 hour of labour produces 1 unit of services. Suppose further that production of housing involves both labour and capital, with production function

$$H = \sqrt{L_H K_H}$$

where H is the quantity of housing produced, L_H the quantity of labour used in the housing industry, and K_H the quantity of capital used in the housing sector.

There are fixed quantities available of each input, 100 hours of labour and 64 units of capital.

What are the efficient allocations of capital and labour to the service industry and the housing industry? Illustrate them using an Edgeworth box diagram.

2. What is the production possibility frontier for the technology described in question #1 above?

3. For the production technology described in question #1, what would be the efficient quantities of services and housing, if the economy was populated by many consumers, each of whom had preferences which could be represented by the utility function

$$U(s, h) = 9 \ln s + 32 \ln h$$

where s is the person's consumption of services, h her consumption of housing, and ln denotes the natural logarithm function?

4. What is the equation of the production possibility frontier if food and clothing have the following production functions :

$$F = L_F + K_F$$

$$C = \sqrt{L_C K_C}$$

where L_F, K_F, L_C, K_C are the quantities of labour and capital used in the two industries, and F and C are the quantities produced of food and clothing, if the economy's total endowments of inputs are 120 hours of labour and 180 units of capital?

5. If a country's production possibility frontier had the equation

$$C = 32 - F^2$$

(where C and F are the quantities produced of food and clothing), and if the country can import and export all the food and clothing it wants, at prices of \$1 per unit of clothing, and \$8 per unit of food (provided only that the value of exports equals the value of imports), what are the quantities of food and clothing available to the country? (That is, given the production possibility frontier, and the world prices, what is the "consumption possibility frontier" of combinations (F, C) which are available for aggregate consumption in the country?)