

## First Midterm Exam

Each part of a question (a, b, c, etc.) is worth 5 points. Make sure to allot your time accordingly. Total of 30 points, -1 for messiness, -2 for extreme messiness.

When you are finished, please keep the exam sheet and hand in your blue book. Thanks.

1. *Medical* 2. Prices of medical services have been rising much faster than other goods and services in the economy. Let  $\mu$  be medical services and  $x$  be all other goods. Suppose that a consumer has a demand curve for medical services of

$$\mu(p_\mu, p_x, m) = \frac{m}{4.5p_\mu}$$

- (a) In 2007, the prices were  $p_x = 1$ ,  $p_\mu = 1$ , and  $m = 54.5$ . By 2011 prices had risen to  $p'_x = 1.08$ ,  $p'_\mu = 1.12$  and income had fallen to  $m' = 50.1$ . Draw an indifference curve diagram, (with  $x$  on the x-axis) showing the two budget lines and the two optimal points. Remember that all income not spent on  $\mu$  is spent on  $x$ .
- (b) Calculate the Laspeyres price index for the price change from 2007 to 2011.
- (c) Calculate the Paasche price index for the price change from 2007 to 2011.
- (d) If the consumer had been given a raise based on the Laspeyres price index, how much  $x$  and  $\mu$  would she have consumed in 2011. Would her utility have been higher or lower than in 2007?

2. *Sopranos*. There are two goods, numeraire  $x$  and cooking  $c$ . The price of numeraire is always 1 throughout this problem, and the price of cooking is  $p_c$ .

Mrs. Soprano and Mrs. Bucco both have the same utility function:

$$u(x, c) = x^{0.8}c^{0.2}$$

Mrs. Soprano's endowment is  $(\omega_{Sx}, \omega_{Sc}) = (100, 10)$ . Mrs. Bucco's endowment is  $(\omega_{Bx}, \omega_{Bc}) = (10, 10)$ .

With this utility function and these endowments, the demand functions for numeraire for Mrs. Soprano and Mrs. Bucco are

$$x_S = 0.8 \frac{100 + 10p_c}{1} \quad x_B = 0.8 \frac{10 + 10p_c}{1}$$

- (a) If the two women can trade in an Edgeworth Box, what will be the final allocation and what will be the price of cooking?
- (b) Suppose that the "powers that be" decide that this final allocation is not all right. They want the final allocation to be  $(x_B, c_B) = (66, 12)$ . Note that  $(66, 12)$  IS on the contract curve. What lump sum taxes and subsidies on the numeraire are necessary to make this happen? Illustrate with an Edgeworth Box diagram.