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

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 than 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.