EMPA Fall 2002 Take-home Microeconomics Midterm

Show your reasoning using graphs, math, or words when appropriate. Keep answers brief. On multiple-part questions, each part counts as 3 points unless otherwise marked. Good Luck. (Total points possible: $39 + 18 + 18 = 75$)

1. (12 points) WARM-UP QUESTION.
   a. (6 points for a) Write your name on your exam paper. Suppose blue books are an income-inferior good when answering parts (b) and (c).
   b. Define briefly an income-inferior good.
   c. What happens to demand for blue books when income falls.

2. (12 points) Propose a consistent explanation of the following based on a movement of either the supply or the demand curve (but not both) in the coffee market. Provide a creative reason that might explain why the demand or supply curve has changed.
   a. The price of coffee rises and quantity sold falls.
   b. The price of coffee falls and quantity sold rises.
   c. In the past few months, the wholesale price of coffee beans has fallen about 40% in the international market. Several countries have recently begun production. Also, coffee demand is known to be inelastic. Describe the price fall using supply and demand curves. Is it inconsistent with supply and demand theory that quantity consumed has risen only 5%?
   d. You observe quantity sold doesn't change while price rises.

3. (9 points) Suppose the market demand curve for Bill Eimicke’s new workout video is very inelastic with respect to own price.
   a. Draw a demand curve that is very inelastic and one very elastic with respect to own price.
   b. Is an inelastic demand curve consistent with lots of substitutes or few substitutes. Why?
   c. What would we expect will happen to elasticity in the long-run? Why? Show graphically.

4. (6 points total) Briefly define 3 of the following 4 terms (2 points for each answer).
   a. Marginal utility of a good.
   b. Substitution effect of a price change.
   c. Engel curve.
   d. Labor force participation rate.

DO EITHER 5 OR 6 BUT NOT BOTH (18 points for either).

5. (18 points) Let $U(x,y) = x^{0.5}y^{0.5}$, and let income and prices be denoted by $I$, $P_x$, $P_y$.
   a. Find the marginal rate of substitution.
   b. Explain in words the meaning of the marginal rate of substitution.
   c. Write down the condition for the utility-maximizing solution. Can I interpret this solution as the point where I choose $X$ and $Y$ such that the marginal utility of all goods is equal? Explain.
   d. If $I=100$, $P_x=1$, and $P_y=1$, find the optimal bundle consumed.
   e. Find the function that describes this person's demand for $X$.
   f. Is $Y$ a complement or substitute for $X$ (hint: look at how $P_y$ enters the $X$ demand function)?

6. (18 points) Starting from income of $100 and prices of bacon and eggs of $2 and $1. Initially, you
buy 25 units of bacon and 50 units of eggs.
a. Draw the budget line.
b. Assume you have smooth, convex preferences (no right-angle indifference curves), draw an
indifference curve with the budget line that justifies your optimal choice of eggs and bacon.
c. Suppose income and prices double (a 100% increase in income and prices), what happens to your
budget set? What happens to your choice of eggs and bacon? Explain briefly.
d. Suppose the price of bacon goes up 50% but the price of eggs is unchanged. What is the inflation rate
for you?
e. How much of a CPI-like inflation-indexed increase in income is needed to enable you to buy your
original bundle?
f. If you get the income increase described in (e), will your welfare rise, fall, or be the same? Justify by
drawing a budget line and an indifference curve.

DO BOTH 7 AND 8

7. (9 points) Consider someone who works 40 hours/week at 10$/hour (assume 100 hours per week are
available to divide between work and leisure).
a. Illustrate the consumption-leisure choice graphically.
b. Suppose the government is considering a 20% income tax or an 80$ per-week head tax. At 20%, the
government calculates that the two taxes will raise the same revenue? Do you agree? What do we expect
to happen to hours worked under each tax?
c. What will have to happen for the government to raise $80 under the income tax? Could it be possible
that the government may never be able to raise $80 with an income tax? Justify your answer graphically.

8. (9 points) The world has a fixed supply of oil. Each year we use some fraction of that supply.
Given current rates of consumption, Ralph Nader has computed that the world will run out of oil in 25
years.
First, draw a graph to illustrate Mr. Nader’s argument.
Second, evaluate Mr. Nader’s claims using supply and demand analysis. Tell me what your
analysis predicts about price and consumption over time.
Will we run out in 25 years?