V/C31.0010.002. Fall 1999

Answers to Intermediate Microeconomics Sample Midterm 1

(1) (**30 points, 5 points per part**) Are the following statements true or false? A simple yes-no answer will *not* suffice. Explain, with the use of diagrams where necessary.

[**a**] True. While the income effect is negative for an inferior good, this may be (and generally is) outweighed by the substitution effect. The effect of a price change is the composition of these two effects, so inferiority is quite compatible with a downward sloping demand curve. [Now draw a diagram showing a price change, where the income effect is negative (inferior good), yet prices and quamntities demanded move in opposite directions.]

[**b**] False. This is typically true, but not always true. It is always true that the highest indifference curve is reached given the budget constraint, but this does not necessarily imply this equality. [Draw a diagram showing a corner solution. Use the perfect substitutes example done in class.]

[**c**] True. The new utility function is just 4 times the logarithm of the old utility function. So the new function is just a rescaling of the old one, and the indifference curves are left unchanged.

[**d**] False. $e = -\frac{\Delta Q}{\Delta P}\frac{P}{Q}$. Now $\frac{\Delta Q}{\Delta P}$ stays constant along a straight-line demand curve (it's just the constant slope). But the P/Q term varies. Thus the elasticity of a linear demand curve varies from ∞ at the "top", where the quantity is zero, to 0 at the "bottom", where the price is at zero.

[**e**] False. [Here look at Chapter 5, Figure 5.20 on page 143. You should be able to reproduce this diagram with brief explanatory comments.]

[**f**] False. It is the assumption of nonsatiation that drives this. For instance, imagine preferences in which every budle is indifferent to every other bundle. Then transitivity is satisfied, but there is only one indifference curve that covers the entire commodity space.

(2) (**40 points, 10 points per part**) Answer the following questions briefly and clearly. You can put in a diagram, and/or a simple example to illustrate. *These are not true-false questions.*

(i) First draw a diagram, and geometrically show the gain in consumer surplus (this will get you partial credit). Now calculate. At a price of 3, the consumer surplus is the area between the demand curve and the price line. This triangle has a height of 17 (the difference between the chokeoff price, which is 20, and 3) and a length of 8.5. So the area of the triangle is $\frac{1}{2} \times 17 \times 8.5$. This is the consumer surplus at a price of 3. Similarly calculate the consumer surplus at a price of 5, which is $\frac{1}{2} \times 15 \times 7.5$. The difference between the two (use a calculator) is the gain in consumer surplus when the price falls from 5 to 3.

(ii) This is exactly the opposite of the housing subsidy problem done in class. Start with a diagram in which you place a tax on good A. Now show in the diagram the tax revenue raised at the new consumer optimum. Next, construct the equivalent variation — which is just a lump sum tax designed to get the consumer on the same (new) indifference curve *without* any change in prices. To complete the answer, show that the equivalent variation takes away more money from the consumer than the commdity tax did.

(iii)

a) Amanda: These will be straightline indifference curves with a slope of -2 (assuming that you put Tylenol on the horizontal axis).

b) Bob: Put pizza on the horizontal axis and peppers on the vertical axis. Then the indifference curves must look like this:

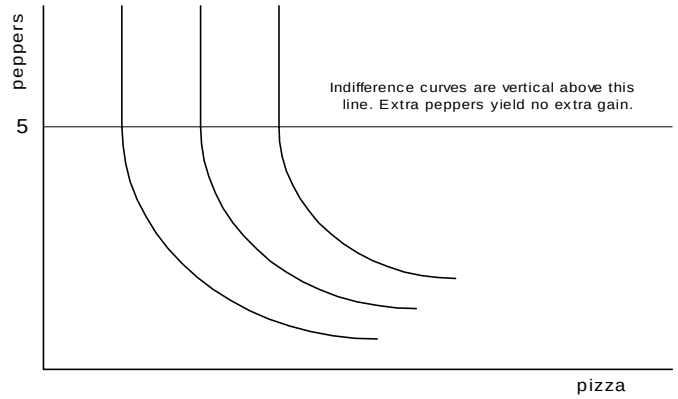

Figure 1: Bob's indifference curves for peppers and pizza.

(iv) See diagram. Mary's budget constraint is the familiar line *plus the spike sticking up to \$100 at the 24 leisure point*. At a wage rate of \$15 per hour, she is exactly indifferent between not working at all and working 10 hours a day (this is shown by the fact that the black indifference curve is both tangent to the \$15 wage line *and* passes through the \$100-24 hours combination from not working). At any lower wage, she will simply not work (because this is the best indifference curve she can attain). At any higher wage she moves on to higher indifference curves. But I have drawn the curves so that she works constant hours regardless of wage, which is what the question asked us to do.

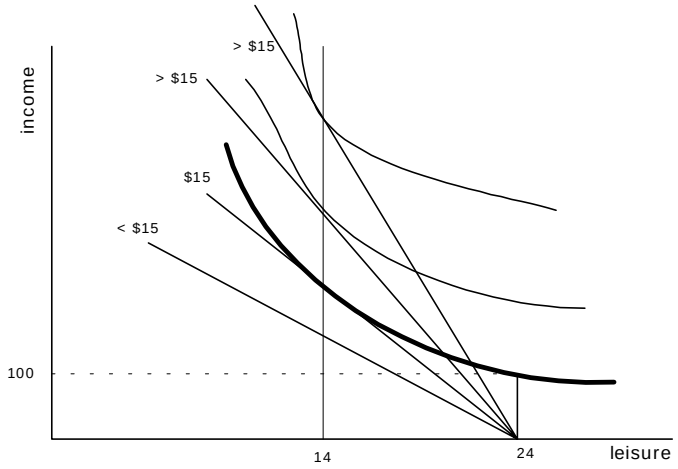

Figure 2: Mary's work habits.

Draw the supply curve of labor yourself. It should be at zero until the wage hits \$15 per hour, and then should immediately jump to 10 hours and stay there.