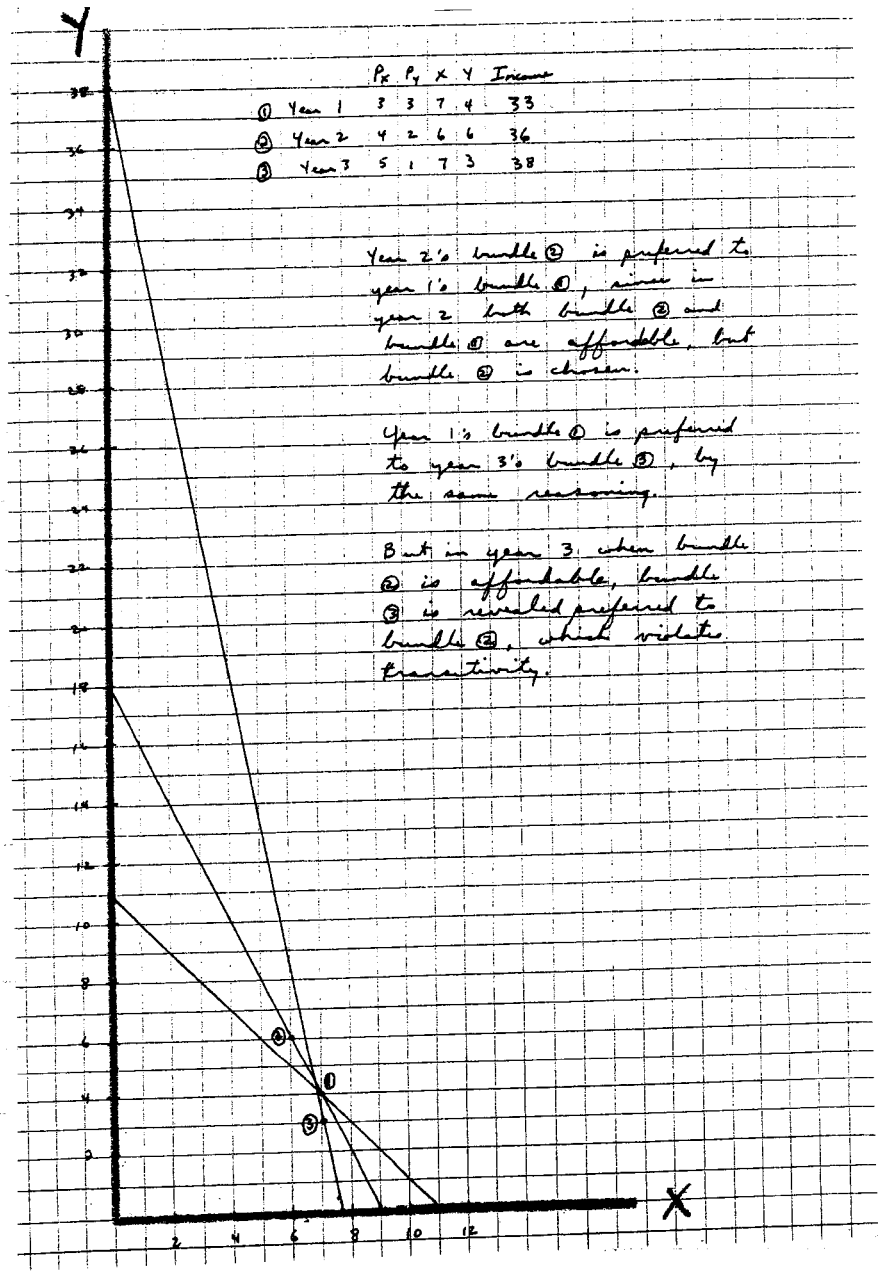
ECO 601 1st Test KEY Fall 2003

1. $\varepsilon_{X,P_Y} = \varepsilon^S_{X,P_Y} - S_Y \varepsilon_{X,I}$; $\varepsilon_{Y,P_X} = \varepsilon^S_{Y,P_X} - S_X \varepsilon_{Y,I}$

$\varepsilon_{X,P_Y} = (+) - (+)(-)$; $\varepsilon_{Y,P_X} = (+) - (+)(+)$

so TRUE, if X is inferior it causes income effect to work counter to the cross-price substitution effect.

2. Max really is Mad. His consumption behavior is not rational.



	P_X	P_Y	X	Y	Income
① Year 1	3	3	7	4	33
② Year 2	4	2	6	6	36
③ Year 3	5	1	7	3	38

Year 2's bundle ② is preferred to year 1's bundle ①, since in year 2 both bundle ② and bundle ① are affordable, but bundle ② is chosen.

Year 1's bundle ① is preferred to year 3's bundle ③, by the same reasoning.

But in year 3 when bundle ② is affordable, bundle ③ is revealed preferred to bundle ②, which violates transitivity.

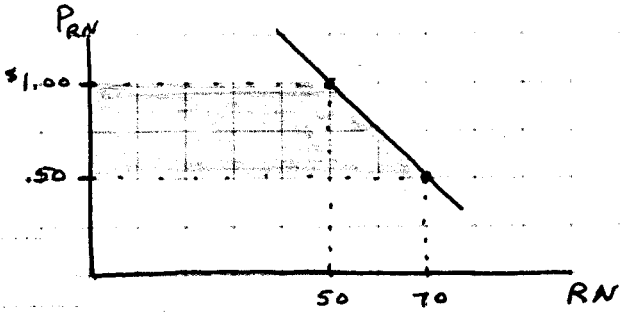
3. (a) See diagram: consumption bundles ⓐ and ⓑ.

(b) substitution effect ⓐ → ⓒ, or $RN = 50$ to $RN = 80$.

income effect ⓒ → ⓑ, or $RN = 80$ to $RN = 70$.

total effect ⓐ → ⓑ, or $RN = 50$ to $RN = 70$.

(c)



change in consumer's surplus = 

$(.50)(50) + \frac{1}{2}(.50)(20) = \$30$

4. $U = Y^{.8} F^{.2}$, $I = 500$, $P_Y = 1$, $P_F = 2$

(a) $\mathcal{L} = Y^{.8} F^{.2} + \lambda(I - P_F F - P_Y Y)$

$\frac{\partial \mathcal{L}}{\partial Y} = .8 Y^{-.2} F^{.2} - \lambda P_Y = 0$

$\frac{\partial \mathcal{L}}{\partial F} = .2 Y^{.8} F^{-.8} - \lambda P_F = 0$

$\Big\} \quad \frac{.8F}{.2Y} = \frac{P_Y}{P_F} \Rightarrow 4FP_F = YP_Y$

$\frac{\partial \mathcal{L}}{\partial \lambda} = I - P_F F - P_Y Y = 0$

$I - 4P_F F - P_F F = 0$, $F^* = \frac{I}{5P_F}$

$I - P_Y Y - \frac{1}{4} P_Y Y = 0$, $Y^* = \frac{4I}{5P_Y}$

if $I = 500$, $P_Y = 1$, $P_F = 2$, then $F^* = 50$ and $Y^* = 400$

$U = (400)^{.8} (50)^{.2} = 263.9$

(b) if $I = 700$, then $F^* = 70$ and $Y^* = 560$

$U = (560)^{.8} (70)^{.2} = 369.5$

4. (c) see diagram. Ronald's utility maximizing bundle given his new kinked budget constraint is $F = 100$ and $Y = 500$.

$$U = (500)^{.8}(100)^{.2} = 362.4$$

(d) if Ronald were consuming Y and F such that $MRS_{F,Y} = \frac{P_F}{P_Y}$, what combination of Y and F would give $U = 362.4$?

$$MRS_{F,Y} = \frac{P_F}{P_Y} \Rightarrow \frac{4FP_F}{YP_Y}$$

$$\Rightarrow \frac{4 \cdot F \cdot 2}{Y \cdot 1}$$

$$\Rightarrow Y = 8F$$

$$362.4 = (8F)^{.8}(F)^{.2} = (8)^{.8}F^{.8}F^{.2}$$

or $F = 362.4 / 8^{.8} = 68.7$

$$Y = 8F = 549.3$$

$$TC = 2 \cdot 68.7 + 1 \cdot 549.3 = \$686.70$$

so Ronald would be willing to accept $186.70 in place of $200 of food stamps.

5. $U = S + \ln B$; $I = 6$, $P_S = 2$, $P_B = 1$

(a) $\mathcal{L} = S + \ln B + \lambda(I - P_S S - P_B B)$

$$\left.\begin{aligned} \frac{\partial \mathcal{L}}{\partial S} &= 1 - \lambda P_S = 0 \\ \frac{\partial \mathcal{L}}{\partial B} &= \frac{1}{B} - \lambda P_B = 0 \end{aligned}\right\} \quad B = P_S/P_B$$

$$\frac{\partial \mathcal{L}}{\partial \lambda} = I - P_S S - P_B B = 0$$

$$B^* = \frac{P_S}{P_B}, \quad S^* = \frac{I - P_S}{P_S} = \frac{I}{P_S} - 1$$

$$\varepsilon_{B,P_B} = \frac{\partial B}{\partial P_B} \cdot \frac{P_B}{B} = -P_S P_B^{-2} \cdot P_B / (P_S/P_B) = -1$$

$$\varepsilon_{B,P_S} = \frac{\partial B}{\partial P_S} \cdot \frac{P_S}{B} = \frac{1}{P_B} \cdot \frac{P_S}{P_S/P_B} = 1$$

$$\varepsilon_{B,I} = \frac{\partial B}{\partial I} \cdot \frac{I}{B} = 0$$

5. (a) (cont.) $\varepsilon_{S,P_S} = \frac{\partial S}{\partial P_S} \cdot \frac{P_S}{S} = \left(-I P_S^{-2}\right) \cdot \frac{P_S}{(I - P_S)/P_S}$

$$= -\frac{I}{I - P_S}$$

$$\varepsilon_{S,P_B} = \frac{\partial S}{\partial P_B} \cdot \frac{P_B}{S} = 0$$

$$\varepsilon_{S,I} = \frac{\partial S}{\partial I} \cdot \frac{I}{S} = \frac{1}{P_S} \cdot \frac{I}{(I - P_S)/P_S} = \frac{I}{I - P_S}$$

(b) Sum of all elasticities must equal zero:

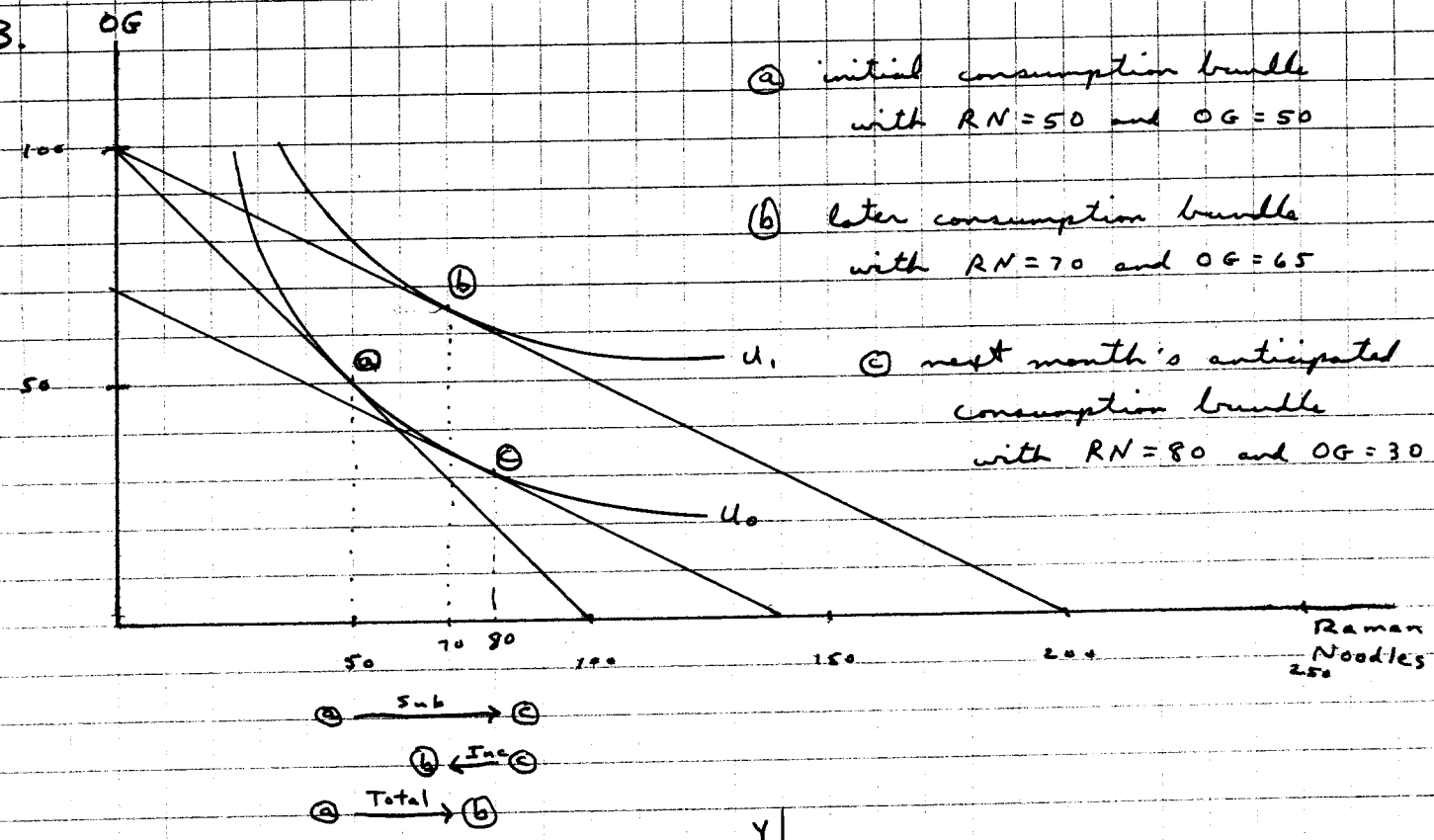
$$\varepsilon_{B,P_B} + \varepsilon_{B,P_S} + \varepsilon_{B,I} = 0 \quad ?$$

$$(-1) + (1) + (0) = 0 \quad \checkmark$$

$$\varepsilon_{S,P_S} + \varepsilon_{S,P_B} + \varepsilon_{S,I} = 0 \quad ?$$

$$\left(-\frac{I}{I - P_S}\right) + (0) + \left(\frac{I}{I - P_S}\right) = 0 \quad \checkmark$$

3.



(a) initial consumption bundle with RN = 50 and OG = 50

(b) later consumption bundle with RN = 70 and OG = 65

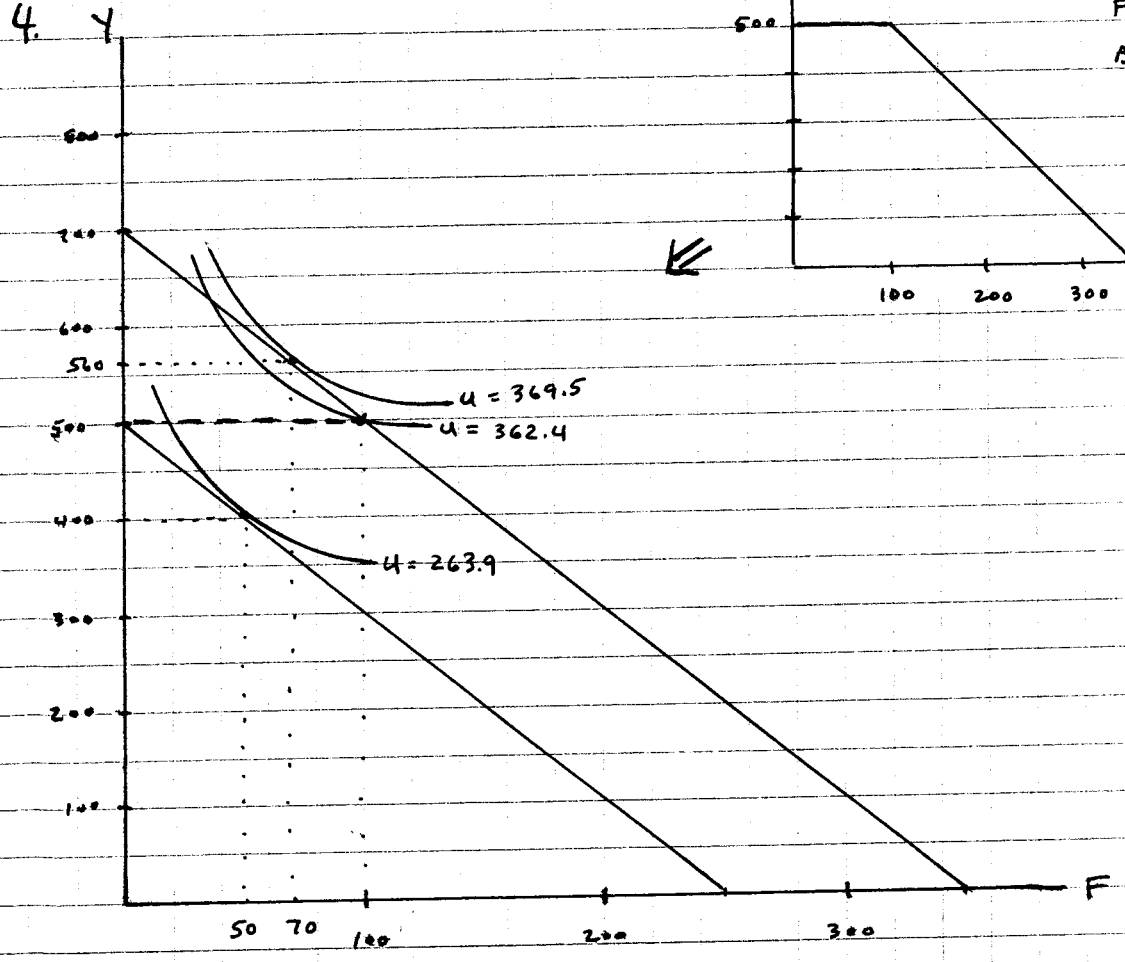
(c) next month's anticipated consumption bundle with RN = 80 and OG = 30

a → c Sub

b ← c Inc

a → b Total

4.



FOOD STAMP BUDGET CONSTRAINT

ECO 601 1st Test Fall 2003

1. (10 pts.) TFUE: In a two-good world, suppose that X is inferior and Y is normal. Then the cross-price elasticity of good X with respect to the price of Y will likely be larger than that of good Y with respect to the price of X.

2. (15 pts.) Over a three-year period Mad Max exhibits the following consumption behavior:

	P_x	P_y	X	Y
Year 1	3	3	7	4
Year 2	4	2	6	6
Year 3	5	1	7	3

As an economist, what do you think about the rationality of Max's behavior? Is he really mad, or does he exhibit rational consumption behavior?

3. (25 pts.) Albert is a poor undergraduate student majoring in physics. His monthly income is \$100, and he consumes only two goods, Raman noodles (R) and other goods (OG). Initially the price of other goods is \$1 per unit, and the price of Raman noodles is \$1 per package. Albert is a clear-thinking and rational person, and under these conditions he is happiest if he consumes 50 packages of Raman noodles per month. Now, the price of Raman noodles falls from \$1.00 to \$.50 per package. In response, Albert increases his consumption to 70 packages per month.
   a) Using indifference curves and budget lines, illustrate Albert's initial situation and new situation in the attached diagram.
   b) Next month Albert is planning to graduate. He is going to have to pay library fines and parking tickets that will reduce his income from \$100 to \$70. In thinking about how he will spend his \$70 income, he is confident that he will be just as happy when his income is \$70 and the price of Raman noodles is \$.50 as he was when his income was \$100 and the price of Raman noodles was \$1.00. He anticipates that he will want to consume 80 packages of Raman noodles next month. With that information, illustrate the income and substitution effects for Albert when his nominal income is fixed at \$100 and the price of Raman noodles falls from \$1.00 to \$.50 per package.
   c) Illustrate Albert's Marshallian demand curve for Raman noodles. What is the increase in Albert's consumer's surplus when price falls from \$1.00 to \$.50?

4. (30 pts.) Ronald McDonald's utility function is given by $U=Y^{.8}F^{.2}$, where F is food consumption and Y is the composite good. Ronald's income is \$500, the price of Y is \$1, and the price of Food is \$2.
   a) How much F and how much Y will Ronald consume if he is maximizing utility? What is his level of utility? Illustrate in the attached diagram.
   b) Ronald qualifies for a \$200 cash grant from the government, bringing his income up to \$700. Answer the same questions as in (a). Illustrate.
   c) Suppose that instead of giving Ronald \$200 in cash, government instead gives Ronald \$200 worth of food stamps. These enable Ronald to purchase food but cannot be spent on anything else. Illustrate the change in Ronald's budget constraint, and show the consumption bundle and associated indifference curve that Ronald will choose.
   d) What is the cash equivalent that Ronald would be willing to accept in place of the \$200 worth of food stamps?

5. (20 pts.) The Hamburglar has a utility function given by $U = S + \ln B$, where S represents milkshake consumption and B represents hamburger consumption. He decides to give up his life of crime, and takes a job earning income I=6. When he purchases burgers and shakes rather than stealing them, he pays prices $P_S = 2$ and $P_B = 1$.
   a) Calculate the Hamburglar's own-price, income, and cross-price elasticities for both hamburgers and milkshakes. (Hint: you first must derive the Marshallian demand functions for burgers and shakes.)
   b) Confirm that the Euler Theorem Elasticity Identity holds for both hamburgers and for milkshakes.