ECONOMICS 212
MAKE-UP MIDTERM EXAM

March 12, 2009

NAME:

STUDENT NUMBER:

SECTION: Answer Key

INSTRUCTIONS: Please answer all questions in this exam booklet. If you run out of space on a question, please continue your answer on the back of the question paper. The grade assigned to each question is indicated beside the question.

Part A

Question One [5 marks]

The market for bags of oranges is characterized by a demand function of the form $Q^D = 4400 - 300P$ and a supply function of the form $Q^S = 100P - 400$, where Q is quantity and P is price. Calculate the equilibrium price and quantity in the market. Now suppose a drought causes quantity supplied to decrease by 600 bags at each price. Calculate the new equilibrium price and quantity.

$Q^D = Q^S$

$4400 - 300P = 100P - 400$

$P = 12$

$Q = 800$

$Q^{S'} = 100P - 1000$

$Q_D = Q_S$

$4400 - 300P = 100P - 1000$

$400P = 5400$

$P = 13.5$

$Q = 350$

Question Two [5 marks]

A consumer is always willing to trade five units of good X for three units of good Y. The price of good X is two and the price of good Y is one. The consumer's income is $700. Determine the consumer's optimal bundle.

$u(x,y) = (3x + 5y)$

$P_x / P_y = 2$

$MRS = \frac{3}{5}$

$MRS < P_x / P_y$

$\Rightarrow y^* = \frac{I}{P_y} = \frac{700}{1} = 700$

$x^* = 0$

Question Three [5 marks]

Paul has 16 hours per day to divide between work and leisure, R. When Paul works he earns $20 per hour. Paul spends his income on a composite consumption good, C, with a price equal to one. Draw and appropriately label Paul's budget constraint. Now suppose the government introduces an income support program such that Paul receives $150 per day if he does no work. For each dollar Paul earns, the government reduces his income support payment by 50 cents. Draw and appropriately label his new budget constraint.

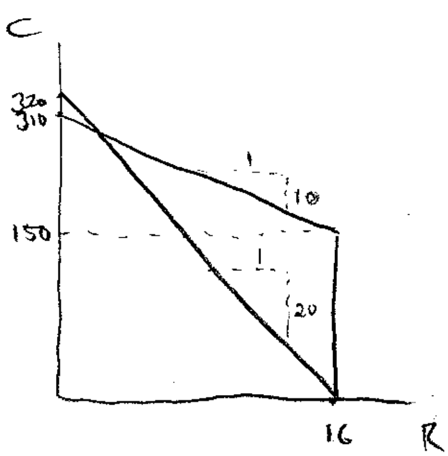
$C + w.R = wT$

$C + 20R = 320$

\$1 ⇒ W - \$.5

\$20 ⇒ W - \$10

1 hour ⇒ W - \$10



Part B

Question One

Yu has $100 and can keep his money or choose one of two lotteries, each costing $100. Lottery A has an 80% probability that Yu will finish with $0 and a 20% probability that he will finish with $500. Lottery B has a probability of 50% that Yu finishes with $60 and a 50% probability that he finishes with $140. Yu has a utility function defined over income that is given by $U(I) = I^2$.

a) [5 marks] Will Yu choose to keep his money or will he choose one of the lotteries? Show your work.

A: $EU_A = 0.8u(0) + 0.2u(500)$
$= 50\,000$

B: $EU_B = .5u(60) + 0.5u(140)$
$= 1800 + 9800$
$= 11600$

$u(100) = 10000.$

$EU_A > EU_B > u(100).$ choose A

b) [5 marks] For each of the lotteries A and B determine how much the higher outcome must decrease to just make Yu indifferent between the lottery and keeping his cash in pocket.

A: $0.8u(0) + 0.2u(A) = u(100)$

$A^2 = (10000)5$

$A \approx 224.$

B: $0.5u(60) + 0.5u(B) = 10000$

$1800 + 0.5B^2 = 10000$

$B^2 = (8200)2$

$B \approx 128$

c) [5 marks] Consider a risk averse person with a utility of income function given by U (I) = I $^{1/2}$ and the lottery A described above. Calculate the smallest amount of money that could be offered to the risk averse person that would induce him/ her to accept the lottery.

$EU_A = 0.8u(0) + 0.2u(500)$

$= 0 + 4.47$

$u(CE) = EU_A$

$(CE)^{\frac{1}{2}} = 4.47$

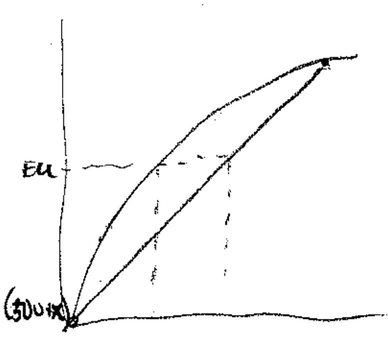
$CE = 20$

$EU_A = 4.47.$

$u(100) = 10$

$EU = 0.8u(0+x) + 0.2u(500+x)$

$= 0.8x^{\frac{1}{2}} + 0.2(500+x)^{\frac{1}{2}} = 10$ 20

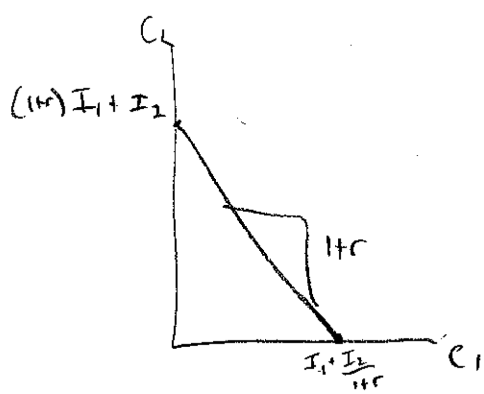


Question Two

Raoul earns \$2,500,000 in the first period of his life and \$300,000 in the second period of his life. He can save or borrow at an interest rate of 4%. His utility depends on his consumption in each period and is given by U (C_1, C_2) = Min {$2C_1$; C_2}, where 1 is the first period and 2 is the second period.

a) [5 marks] Write the future value version of Raoul's budget constraint and draw and appropriately label the budget constraint.

$$C_1 + \frac{C_2}{1.4} = 2.5 \text{ mil} + \frac{0.3 \text{ mil}}{1.4}$$



b) [5 marks] Derive Raoul's optimal bundle and his level of savings or borrowing.

$$2C_1 = C_2$$

$$C_1 + \frac{2C_1}{1.4} = 2.5 + \frac{0.3}{1.4}$$

$$3.4C_1 = 3.5 + 0.3$$

$$C_1 = 1.12 \text{ mil}$$

$$C_2 = 2.24 \text{ mil}$$

$$\text{savings} = 2.5 - 1.12 = 1.38 \text{ mil}$$

c) [5 marks] Raoul's friend has a utility function defined by U (C_1, C_2) = $3C_1 + C_2$. Given the same income and interest rate as Raoul, determine his friend's optimal bundle and level of savings or borrowing.

$MRS = 3.$ $1+r = 1.4$

$MRS > (1+r)$

$C_1 = I_1 + \frac{I_2}{1+r} = 2.5 + \frac{0.3}{1.4} = 2.71$

$C_2 = 0$

Question Three

Steven consumes the goods X and Y according to the utility function U (X, Y) = $X^{1/2}$ Y where the prices of the goods are P_x and P_y. Steven has an income of I.

a) [5 marks] Derive Steven's demand functions for the two goods.

$x^* = \frac{1}{3} \frac{I}{P_x}$

$y^* = \frac{2}{3} \frac{I}{P_y}$

$$\frac{\frac{\partial u}{\partial x} = \frac{1}{2} x^{-\frac{1}{2}} y}{\frac{\partial x}{\partial y} \quad x^{\frac{1}{2}}} = \frac{1}{2}\frac{y}{x} = \frac{P_x}{P_y} \qquad P_x x + P_y \frac{P_x}{P_y} 2x = I \qquad x = \frac{I}{3P_x}$$

b) [5 marks] Let the price of X be 2, the price of Y be 8, and Steven's income be \$2,400. Solve for the optimal combination of the two goods.

$$x^* = \frac{1}{3}\frac{2400}{2} = 400$$

$$y^* = \frac{2}{3}\frac{2400}{8} = 200$$

c) [5 marks] Suppose the price of X increases to 4. Calculate the new final demand for X and the substitution and income effects of the price increase.

$$x^{**} = \frac{1}{3}\frac{2400}{4} = 200$$

$$u(x^*, y^*) = 4000$$

$$u(\hat{x}, \hat{y}) = \left(\frac{1}{3}\frac{\hat{I}}{4}\right)^{\frac{1}{2}}\left(\frac{2}{3}\frac{\hat{I}}{8}\right) = 4000$$

$$\frac{1}{12\sqrt{12}}\hat{I}^{\frac{3}{2}} = 4000$$

$$\hat{I} = \left((4000)12\sqrt{12}\right)^{\frac{2}{3}}$$

$$\approx 3024$$

$$\hat{x} = \frac{1}{3}\frac{\hat{I}}{4} = \frac{1}{3}\frac{3024}{4} = 252$$

$$\hat{y} = \frac{2}{3}\frac{\hat{I}}{8} = 252$$

Subs $x: \hat{x} - x^* = -148$

$y: \hat{y} - y^* = 52$

Inc $x: x^{**} - \hat{x} = -52$

$y: y^{**} - \hat{y} = -52$