考試科目	個體經濟學	系所別	經濟系	考試時間	2月2日(四) 第二節

Problem 1 (19 points)

Jerry purchases only two goods, apples (q_1) and oranges (q_2). He has an income, m, of 60 dollars. Suppose the price of an apple is \$4, and the price of an orange is \$2.

a) (2 points) Write down Jerry's budget constraint and plot his budget set. What is the economic interpretation for the slope of the budget line?

b) (4 points) Suppose Jerry's utility function is given by

$$U(q_1, q_2) = [(2\ln q_1 + \ln q_2)^2 + 6]^{1/3}$$

Can you find a simp

ler utility function that represents the same preferences? Explain why your proposal is valid.

c) (2 points) Write down the formula for Jerry's MRS. Give an economic interpretation of the MRS.

d) (6 points) What bundle of apples and oranges should Jerry purchase to maximize his utility?

e) (2 points) Following d), how much money would Jerry spend on apples and oranges, respectively?

f) (3 points) Suppose the price of an apple becomes \$5.5, and the price of an orange becomes \$2.5. How much money now would Jerry spend on apples and oranges, respectively?

Problem 2 (6 points)

Answer each of the following questions within 3 sentences. Please give the rationale behind your answers. You don't need to write down any equations.

a) (3 points) When elasticity of demand is high, will a monopoly have a higher or lower margin (i.e., the difference between price and marginal cost)? Why?

b) (3 points) "*It is widely known that having a higher education is good for the person himself or herself, but also for the public in general.*" Based on this statement, suppose we leave the provision and funding of education entirely to the market. Should we expect a higher or lower average level of education? Why?

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。

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Problem 3 (13 points)

We are in the World Cup, and the penalty kicks will now decide the game. The kicker (person 1) can kick the ball in 3 possible directions, {L, M, R}, and the goalie (person 2) needs to decide in which direction among {L, M, R} he should dive for the ball. The following is the payoff matrix for the two players, and the numbers correspond to the probability that the players will succeed (i.e., the kickers will kick the ball in, or the goalie will make the save.)

1 \ 2	L	M	R
L	2/5, 3/5	4/5, 1/5	1, 0
M	3/5, 2/5	0, 1	3/5, 2/5
R	1, 0	4/5, 1/5	1/5, 4/5

a) (5 points) Find the pure strategy Nash Equilibrium in this game, if any.

b) (8 points) Find the mixed strategy Nash Equilibrium in this game, if any.

Problem 4 (12 points)

A new neighborhood is developed on a new linear street, the interval [0,1]. Three convenience stores will open sequentially, with store 1 choosing its location first, then store 2 will select its site, and finally, store 3 will choose its location. Suppose the homogeneous customers are uniformly distributed on the linear street, and they will only go to the convenience store that is nearest to them.

Assume that all convenience stores want to maximize their customer bases. Now, store 1 has already chosen its location at $x_1=1/4$.

a) (8 points) What locations will store 2 and store 3 pick, respectively?

b) (4 points) In the end, what is each store's market share?

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Problem 5 (25 points) Suppose that a couple's preferences can be represented by the joint utility function

$$U = \alpha_f \ln(l_f - \bar{l}) + \alpha_m \ln(l_m - \bar{l}) + (1 - \alpha_f - \alpha_m)\ln(x - \bar{x}),$$

where l_f is wife's non-market time; l_m is husband's non-market time; $\bar{l}$ is the minimum non-market time necessary for survival; x is family consumption of market goods; $\bar{x}$ is the subsistence level of market goods consumption; and $\alpha_f > 0$, $\alpha_m > 0$, and $\alpha_f + \alpha_m < 1$ because non-market time and market goods are "goods," not "bads." Clearly, U is defined only if $l_f > \bar{l}$, $l_m > \bar{l}$, and $x > \bar{x}$. The family's budget constraint is

$$px = w_f(T - l_f) + w_m(T - l_m) + y,$$

where p is the price of market goods, w_f and w_m are the wife's and husband's wage rates, T is each individual's time endowment, and y is the family's non-labor income.

a) Show that the utility function can be written as

$$U = \alpha_f \ln(\bar{h} - h_f) + \alpha_m \ln(\bar{h} - h_m) + (1 - \alpha_f - \alpha_m)\ln(x - \bar{x}),$$

where $h_f = T - l_f$ and $h_m = T - l_m$ are the wife's and husband's work time and $\bar{h}$ is each individual's maximum possible work time. (5 points)

b) Assuming an interior solution, use the first-order conditions for utility maximization to derive the wife's labor supply function. (5 points)

c) Show that the family's marginal propensity to consume wife's leisure,

$w_f \partial l_f / \partial y = -w_f \partial h_f / \partial y$, is equal to α_f. (5 points)

d) Derive the slope of the wife's labor supply function with respect to the husband's wage rate, $\partial h_f / \partial w_m$, and see if you can ascertain its sign. (5 points)

e) Use the Slutsky equation to derive the substitution effect of a change in husband's wage rate on wife's labor

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supply. What is the sign of this cross-substitution effect? (5 points)

Problem 6 (25 points) The NCCU Coal Company is the only hirer of labor in its area. It can hire any number of female workers or male workers it wishes. The supply curve for women is given by

$$l_f = 100w_f,$$

and for men is given by

$$l_m = 9w_m^2,$$

where w_f and w_m are the hourly wage rates paid to female and male workers, respectively. Assume that NCCU sells its coal in a perfectly competitive market at $5 per ton and that each worker hired (both men and women) can mine 2 tons per hour.

a) If the firm wishes to maximize profits, how many female and male workers should be hired, and what will the wage rates be for those two groups? How much will NCCU earn in profits per hour on its machinery? (15 points)

b) How will that result compare to one in which NCCU was constrained to pay all workers the same wage based on the value of their marginal product? (10 points)