

ECON 201 – Problem Set 4

- 1- A consumer has quasi-linear preferences that are represented by a utility function:

$$u(x_1, x_2) = x_1 + ax_2^{1/2}$$

Assume that she faces prices (1,1) and has income 64.

- (a) Assume $a=20$ and find the utility maximizing consumption bundle.
 - (b) Assume $a=8$ and find the utility maximizing consumption bundle.
 - (c) Show the conditions for the parameter “a” to have an interior solution. Interpret.
 - (d) Assume $a=12$, for what income levels are there an interior solution?
- 2- Elijah lives in a village where he produces two goods, x and y , according to the production possibility frontier $200 \geq x^2 + y^2$, and he consumes all the goods himself.
- His utility function is

$$u \geq xy^3$$

Elijah also faces resource constraint on his total output of both goods. The resource constraint is given by $x + y \leq 20$

- (a) Write down the Kuhn Tucker first order conditions.
 - (b) Find Elijah’s optimal x and y . Identify which constraints are binding.
- 3- Patrick likes to eat chocolate (c) and drink milk (m). He has the utility function

$$u = c + 2\ln m$$

However, his mother makes him drink milk at least as much as 8 cartons a month. His mother allocates \$120 of her monthly income for chocolate and milk. The price of a chocolate bar is \$10 and a carton of milk is \$5.

(a) Write down the Kuhn Tucker first order conditions.

(b) Find Patrick's optimal C and M.

(c) Suppose now her mother wants him just to be happy and does not force him to drink milk. Would the optimal bundle of Patrick change?

4- Ed's utility from vacations (V) and meals (M) is given by the function:

$$u(V, M) = V^2M$$

Last year, the price of vacations was \$200 and the price of meals was \$50. This year, the price of meals rose to \$75, the price of vacations remained the same. Both years, Ed had an income of \$1500.

a. Calculate the change in consumer surplus from meals resulting from the change in meal prices.

b. What is the compensating variation for the price change in meals?

c. Calculate the equivalent variation for the price change in meals.

5- Find the compensating variation and equivalent variation for the following cases:

a. $u(x_1, x_2) = \min \{x_1, 2x_2\}$

i. $p_1 = 3, p_2 = 4, I = 160, p'_1 = 2, p'_2 = 6$

ii. $p_1 = 3, p_2 = 4, I = 160, p_1^1 = 6, p_2^2 = 4$

b. $u(x_1, x_2) = 2x_1 + 3x_2$

i. $p_1 = 2, p_2 = 4, I = 300, p'_1 = 4, p'_2 = 4$

ii. $p_1 = 2, p_2 = 4, I = 300, p_1^1 = 2, p_2^2 = 3$

6- Hasan's utility function is $U(x, y) = x + 10y - y^2/2$, where x is the number of x 's he consumes per week and y is the number of y 's he consumes per week. Hasan has \$200 a week to spend. The price of x is \$1. The price of y is currently \$5 per unit. Hasan has received an invitation to join a club devoted to the consumption of y . If he joins the club,

Hasan can get a discount on the purchase of y . If he belonged to the club, he could buy y for \$1 a unit. How much is the most Hasan would be willing to pay to join this club?

- 7- Saga's utility function is $U(x, y) = \min\{x, y\}$. Saga has \$150 and the price of x and the price of y are both \$1. Saga is currently living in Malmö but Saga's boss is thinking of sending her to Copenhagen where the price of x is \$1 and the price of y is \$2. The boss offers no raise in pay. Saga, as a completely rational human being, understands compensating and equivalent variation perfectly, and complains bitterly. She says that although she doesn't mind moving for its own sake and the new town is just as pleasant as the old, having to move is as bad as a cut in pay of \$ A . She also says she wouldn't mind moving if when she moved she got a raise of \$ B . What are A and B ?