

## Midterm Exam - Micro I

1. (20 points) You are given the following partial information about a consumer's purchases. He consumes only two goods.

	Period 1		Period 2	
	Quantity	Price	Quantity	Price
Good 1	10	30	12	30
Good 2	10	30	$x$	24

Over what range of quantities of good 2,  $x$ , consumed in period 2 would you conclude:

- (a) That the behaviour is inconsistent (i.e., in contradiction to the weak axiom)?
- (b) That the consumer's choice behavior reveals that he prefers the consumption bundle in year 1 to that in year 2? (Assume that the weak axiom is not violated.)
2. (20 points) Suppose that there are  $i = 1, \dots, I$  consumers with utility functions  $u_i(x)$  and wealth  $w_i$ . We consider a change from price vector  $p^0$  to price vector  $p^1$ . Note that some prices may have gone up and some prices may have gone down, so some consumers may be better off and some consumers may be worse off after the price changes. Show that if  $\sum_i CV_i > 0$ , then we can find  $\{w'_i\}_{i=1}^I$  such that  $\sum_i w'_i \leq \sum_i w_i$  and  $v_i(p_1, w'_i) \geq v_i(p^0, w_i)$  for all  $i$ . That is, it is in principle possible to compensate everybody for the change in prices.

3. (20 points)

Show that a vNM utility maximiser has constant absolute risk aversion with

$$r(x) = -\frac{u''(x)}{u'(x)} = c > 0$$

if and only if  $u(x)$  is a positive affine transformation of  $v(x) = -e^{-cx}$  (if  $c > 0$ ) or  $v(x) = x$  (if  $c = 0$ ).

**QUESTION 1 (30 marks)**

Consider an exchange economy with 2 goods ( $\ell = 1, 2$ ) and 2 consumers ( $i = 1, 2$ ). The utility functions of these consumers are:

$$u_1 = \log x_{11} + 2 \log x_{21},$$

$$u_2 = x_{12}x_{22}.$$

where  $x_{\ell i}$  represents the quantity of good  $\ell$  consumed by consumer  $i$ . The initial endowments are  $\omega_1 = \left(1, \frac{5}{2}\right)$  for consumer 1 and  $\omega_2 = (1, 0)$  for consumer 2.

1. Characterize the Pareto optima of this economy.
2. Represent them in the Edgeworth box.
3. Compute the competitive equilibrium of this economy.

**QUESTION 2 (30 marks)** Consider a production economy with one consumer, 2 goods ( $l=1, 2$ ) and 2 firms ( $j=1, 2$ ). The production functions are  $y_{21} = \sqrt{-y_{11}}$  for firm 1 and  $y_{22} = y_{12}^2$  for firm 2. Good one is an input for both firms and so both  $y_{11}$  and  $y_{12}$  are negative. The utility function of the consumer is  $u = \log x_1 + \log x_2$  and his initial endowment is  $(2, 0)$ .

1. Compute the set of feasible allocations of this economy.
2. Determine the set of Pareto Optimal allocations.
3. Determine the competitive equilibrium.