

## Micro Qualifier Camp / QC 5

### Problem 1. *One-consumer, one-producer economy*

Consider a one-consumer, one-producer economy where the production function is given by  $f(z) = z^{\frac{1}{2}}$  and the consumer's utility function is given by  $u(x_1, x_2) = \ln x_1 + \ln x_2$  where  $x_1$  is leisure and  $x_2$  is the consumption good. The total time endowment is  $L = 1$ . Find the equilibrium wage, price, profit, and consumption.

### Problem 2. *Apples and Applesauce*

Consider a two-good competitive economy with two agents, Ann and Bob, and one firm. Ann and Bob have utility over apples, denoted as  $x$ , and applesauce, denoted as  $y$ :

$$u^A = 2 \ln(1 + x^A) + 3y^A,$$

$$u^B = \ln(1 + x^B) + 3y^B.$$

Consumption of both apples and applesauce must be non-negative and both Ann and Bob have an endowment of 4 apples (and no applesauce).

The firm can convert apples into applesauce. If it uses  $x^f$  apples (with  $x^f > k$ ), it produces  $(x^f - k)^{\frac{1}{2}}$  units of applesauce. The firm is owned by Ann. Assume  $k = 2$  and find the competitive prices and quantities.

### Problem 3. *Romeo and Juliet*

Spring 2001, Part 1, Section II, Problem 3.

### Problem 4. *Risk Aversion*

Suppose that Donald is risk averse and that his utility has the expected utility form. He faces two investment opportunities,  $a$  and  $b$ , with random returns. The payoff of  $a$  is distributed uniformly over the interval  $[2, 3]$ , while  $b$ 's payoff is distributed uniformly over  $[1, 4]$ .

- Suppose that the certainty equivalent of Donald for  $a$  is 2.2. What can we say about the certainty equivalent of  $b$ ?
- Assume both lotteries cost the same. Argue that Donald will never buy  $b$ . Under what conditions will he buy some of  $a$ ?

Donald's brother Pluto has the following utility function

$$u(x) = \begin{cases} \sqrt{x}, & \text{if } 0 \leq x \leq 16 \\ \frac{1}{8}x + 2, & \text{if } x > 16 \end{cases}$$

- c. Is he risk averse? Does he have a continuous and differentiable utility function?
- d. The price of  $a$  is 2.2. He can buy one unit (no more or no less) of  $a$ . What is his decision if his wealth is 2.2?
- e. What is his decision if his wealth is larger than 17.2?
- f. Characterize his decision as a function of his wealth intuitively.