

New Economic School
Microeconomics 3
Problem set #5
Due Week 6

The problems below refer to the material in MWG Chapters 5 and 6.

1. There are two goods in the economy, 1 and 2, and two firms, A and B . Firm A has a linear technology that can produce a unit of good 1 out of one unit of good 2 (but cannot produce good 2 out of good 1). Firm B has a decreasing-returns-to-scale technology which can produce $2\sqrt{\xi}$ units of good 2 out of $\xi > 0$ units of good 1.
 - (a) Draw the production set for each firm.
 - (b) Derive the supply and the profit function for each firm.
 - (c) Derive the aggregate supply and the aggregate profit function.
 - (d) Derive and draw the aggregate production set and illustrate profit maximization with a graph.
 - (e) Suppose that social planner maximizes social welfare function $W = y_1 y_2$ on the aggregate production set. Find the solution. Describe prices p^* such that the aggregate supply at these prices is a solution to the social planner's problem.

2. An agent has initial wealth W and considers undertaking a lottery that pays $X \in (-\infty, +\infty)$, the cumulative distribution function is $F(X)$. If $W + X$ is negative, then the agent has to borrow and pay a high interest rate $R > 0$, so her total expected payoff is $E_X [(W + X) + R \min\{0, W + X\}]$.
 - (a) Is this agent risk-neutral, risk-loving or risk-averse?
 - (b) Are this agent's preferences described by expected utility theory? Derive the Bernoulli utility function $u(\cdot)$.
 - (c) Suppose after deciding to participate in the lottery, but before observing the realization X , she can choose to consume C , so her payoff is $\max_C \{C + E_X [(W - C + X) + R \min\{0, W - C + X\}]\}$. (For simplicity, neglect the constraint $C \geq 0$.) Describe her preferences in this case. Is she risk-averse, risk-loving or risk-neutral? Are this agent's preferences described by expected utility theory? Are they compatible with choices made in Allais paradox?