CS228: Game Theoretical Methodology and Technique for Internet Protocols Midterm Exam Shanghai Jiao Tong University due Submit on 23:59:59 November 7, 2017

Problem 1

The first problem

Problem 2

The second problem

Problem 3

- (a) Given a market where we have : 3 markets agents $M = \{1,2,3\}$, 5 goods at the market $N = \{1,2,3,4,5\}$. The initial endowment of the agents $w^1 = (0,2,0,1,0)$, $w^2 = (0,2,1,0,1)$, $w^3 = (1,0,0,3,0)$, $u_1(x^1) = 3x_1^1$, $u_2(x^2) = 4x_2^2 + 2x_3^2$, $u_3(x^3) = 2x_2^3 + x_4^3$. Given $p = (p_1, p_2, ..., p_5)$, give the expressions to get x^* , the optimal x for every agent. Explain the property: If $x_j^{i*} > 0$, then $\forall t \ \& \ p_t > 0 : \frac{u_j^i}{p_j} \ge \frac{u_t^i}{p_t}$
- (b) Do nomalization and atomization of the market. Why the demand graph is non-zero indegree ?
- (c) What are the differences betwee the initial setting of "Linear Utility Market" and "Fisher Market"?