

Problem Set 1

1. Monopoly Pricing

A monopolist faces a demand function given by $x = 15 - p$, where p denotes the price of the good while x denotes the quantity demanded. The monopolist has access to two different technologies to produce output, the first one is called Guava and the second one is called Froid. Producing x units of the good using Guava technology costs $3x + 2x^2$.

Producing the same using Froid costs $6x + \frac{x^2}{2}$.

How much good would the monopolist produce if forced to use the Guava technology?

If forced to use Froid technology how much good would the monopolist produce?

If the monopolist could choose which technology to use, which would be chosen?

2. Cup of Coffee

With just a few minutes left before their next class both Ann and Bob must get a cup of coffee fast. Both prefer Steingberg Café to Whispers, but they rather not run into each other for fear of continuing the previous days argument regarding Cardinals management. If one of them goes to Steinberg while the other goes to Whispers, then the former gets a utility of 10. Ann gets a utility of 2 from going to Whispers, irrespective of whether Bob shows up too or not. She hates going to Whispers enough, that it could not be made any worse. If both end up going to Steinberg then Ann gets a utility of 4 while Bob gets 1. Finally going to Whispers and not meeting Ann gives Bob a utility of 5, which reduces to 0 if Ann shows up as well.

Write down the payoff matrix for this game. Are there any strategies that are strongly or weakly dominated in this game? Find the reaction (best response) functions. What are the Pareto efficient outcomes of the game? Is this game dominance solvable? If so, then what is the dominance solvable outcome?

3. First Price Auction

A first edition copy of Bovine Barn is being auctioned off by Borders. Sylvia and James are the only bidders for the book. Borders does not value the item, but Sylvia values it at \$10,000 while James values it at \$500. Each of the two bidders must submit a sealed bid which they can choose from \$0, \$250, \$500, \$5000, \$ 10,000 and \$20,000. The bidder with the higher bid wins the book and pays his/her bid. In case of a tie a fair coin is flipped to determine who gets the book.

Write down the payoff matrix for this game. Which strategies are weakly or strongly dominated. Eliminate weakly dominated strategies, then apply iterated strong dominance: which actions survive? Only apply iterated weak dominance : which actions survive? Find the reaction (best response) functions.

4. *Collaborating?*

Keith and Mick are working on a project for which they will receive the same grade. The utility to each of them would be their grade minus 9 times their own effort. If Keith puts in x units of effort and Mick puts in y units of effort their grade will be equal to 6 times the sum of the two effort levels, x and y . So for a given choice of x and y Keith's utility is given by $6(x+y)-9x$ while Mick gets a utility of $6(x+y)-9y$. The possible choices for effort level are 0, 1 and 2.

Write down the payoff matrix for this game. Which outcomes are Pareto efficient? What is predicted by the theory of dominant strategy equilibrium? Find the reaction (best response) functions.

Now suppose the utility functions for Keith and Mick are given by $2(x+y)-x$ and $2(x+y)-y$.

Again, write down the payoff matrix for this game. Which outcomes are Pareto efficient? What is predicted by the theory of dominant strategy equilibrium? Find the reaction (best response) functions.