

## Homework 1

Due in class Tuesday September 18.

1. Tweedeldum and Tweedeldee consume two goods only: weekday wireless minutes and weekend wireless minutes. Tweedeldum has signed on with a service that gives him 1000 weekday minutes, but no weekend minutes and Tweedeldee has a service that gives him 1000 weekend minutes, but no weekday minutes. If you want to make life easy, assume that weekday minutes cannot be used in the weekend and the other way around.
  - (a) In a carefully labeled graph, put in the endowment described above together with some preferences for Tweedeldee and Tweedeldum. Draw the preferences in such a way that both Tweedeldee and Tweedeldum prefers 500 weekday minutes and 500 weekend minutes to their initial endowment.
  - (b) Explain carefully what a competitive equilibrium is in this environment and illustrate how a competitive equilibrium would look like graphically in a NEW GRAPH. *Don't change the preferences or the endowment!*
  - (c) Consider the following alternative trading institution. Tweedeldum first suggests an allocation. Then Tweedeldee either agrees, in which case they consume the allocation suggested by Tweedeldum. If Tweedeldee doesn't agree, they both consume their respective endowments. In a new graph, show how Tweedeldum will choose the allocation. Will this trading institution result in a Pareto Optimal equilibrium?
2. Suppose that Jim has preferences represented by  $U^J(x_1, x_2) = \min\{x_1, x_2\}$  and Dwight has preferences given by  $U^D(x_1, x_2) = x_1 + 2x_2 + 3$ 
  - (a) Draw the indifference curves for Jim and Dwight.
  - (b) Suppose that Jim is endowed with  $e^J = (2, 8)$  and Dwight is endowed with  $e^D = (6, 2)$ . Derive (exactly) the equilibrium price ratio and the equilibrium consumptions and illustrate in a carefully drawn graph.
3. Consider a monopolist producing a good facing a linear inverse demand  $p(y) = 1 - y$ . Also assume that the cost function for the monopolist is given by  $C(y) = y^2$ .
  - (a) Formulate the profit maximization problem for the monopolist (assuming that the monopolist is restricted to linear pricing).
  - (b) Solve the monopoly problem and illustrate in a carefully drawn graph.
4. Carrboro Mad Cows is a professional hockey team. The ticket price is \$5 and they have an audience of 3000 for each game in a building with 5000 seats.
  - (a) Assume that the costs of admitting an extra spectator is zero. Can this pricing be consistent with profit maximization? Explain, using a graph.

- (b) This week they play the Raleigh Lampreys who offers to buy an unlimited amount of tickets at \$4 a piece. The offer is non-negotiable, but the Mad Cows owner may decide how many tickets to sell. Should the Mad Cows sell any tickets to the Lampreys? Should the price they charge to their own fans be below \$4, between \$4 and \$5, \$5 exactly or above \$5? (You should take as given that the greedy owner of the Mad Cows wants as high profits as possible).
5. Consider a world with  $n$  consumers and a monopoly producer of a new product called the *itoaster*. Label the consumers  $i = 1, \dots, n$  and suppose that agent  $i$  is willing to pay up to  $\frac{i}{n}$  dollars for the *itoaster*, and that no consumers want a second unit. Let the unit cost for the product be some  $c$ , where  $0 \leq c < 1$ .
- (a) Assuming that the monopolist can observe  $i$ , what is the optimal pricing strategy for the monopolist. Is this efficient?
- (b) Assuming that the monopolist is forced to set a single unit price  $p$ . Which price is optimal for the monopolist? Is this efficient?
- (c) Let  $p^*$  denote the optimal price that you calculated above and assume that every consumer with  $\frac{i}{n} \geq p^*$  has already purchased the product. Which consumers are still living their life without the *itoaster*?
- (d) What does the monopolist want to do after the consumers with  $\frac{i}{n} \geq p^*$  has walked home with their products.
- (e) [HARD] Assuming the consumers understand how the monopoly will behave after the first batch of *itoasters* are sold, how would this affect the analysis of the monopoly pricing problem in the first stage? Don't attempt to actually perform the analysis, only explain qualitatively how the derivation of the best price is affected.