Seminar 10 - Solution

Review questions

- The market demand curve for heroin is said to be highly inelastic. Heroin supply is also said to be highly monopolized by the Mafia, which we assume to be interested in maximizing profits. Are these two statements consistent with monopoly?
  A: No. The monopolist always operates only on the elastic part of the demand curve.
- If the demand curve facing the monopolist has a constant elasticity of -2, then what will be the monopolist's markup on marginal cost?
  A: Markup = 2 (i.e., price equals two times marginal costs)
- A monopolist is operating at an output level where $|e| = 3$. The government imposes a quantity tax of \$6 per unit of output. (Assume constant MC.)
  - If the demand curve is linear, how much does the price rise?
    A: $\Delta p = 3$ (half of the tax)
  - What if the demand curve has a constant elasticity?
    A: $\Delta p = 9$

Exercises

1. The monopolist faces a demand curve given by $D(p) = 100 - 2p$. Its cost function is $c(y) = 2y$. What is the optimal level of output and price?
   A: $y = 48$, $p = 26$
2. The demand for Professor Bongmore's new book is given by the function $D(p) = 4,000 - 100p$. If the cost of having the book edited and typeset is \$17,000 and the marginal cost of printing an extra copy is \$4, then how many copies at what price he sells to maximize profit? What if the cost of having the book edited and typeset is \$40,000?
   A: $y = 1800$, $p = 22$. If FC = 40000, the optimal output and price will stay the same. The only change is in profit which is now negative: $\pi = -7600$ (before: $\pi = 15400$).
3. Monopolistic firm faces the demand curve $D(p) = 1500 - 50p$ and has the cost function $C(y) = 5y - 600$.
   - Calculate AC, MC, TR and MR as the function of y.
     A: $AC(y) = 5 - \frac{600}{y}$, $MC(y) = 5$, $TR(y) = 30y - \frac{y^2}{50}$, $MR(y) = 30 - \frac{y}{25}$
   - What is the optimal price and output? What is the maximized profit?
     A: $y = 625$, $p = 17.5$, $\Pi = 8,412.5$
   - What is the price elasticity of demand in the optimum?
     A: $e = -1.4$
   - Calculate consumer surplus, producer surplus, deadweight loss.
     A: $CS = 3,906.25$, $PS = 7,812.5$, $DWL = 3,906.25$
   - Calculate the Lerner index and the markup.
     A: $LI = 0.714$, markup = 3.5
4. Monopolistic firm has a cost function $TC(y) = 2y^3 - 30y^2 + 100y$. Market demand function is equal to: $D(p) = 70 - \frac{p}{6}$.
   - Calculate MC, AC and inverse demand function $p(y)$.
     A: $MC(y) = 6y^2 - 60y + 100$, $AC(y) = 2y^2 - 30y + 100$, $p(y) = 420 - 6y$
   - What are y and p in optimum?
     A: $y = 12.33$, $p = 346.02$
   - Given the optimum price, what is the profit of the monopolist?
     A: $\Pi = 3,845.2$

- Using p and MC calculate the markup of the monopolist and Lerner index.
  A: Markup $= 1.27$, $LI = 0.213$

5. (Optional exercise): Monopolistic firm faces the demand curve $D(p) = \frac{239 - p}{5}$ and has a cost function $TC(y) = 4y^2 + 5y + 9$.

   - What are y and p in optimum? What is the profit of the monopolist?
     A: $y = 13$, $p = 174$, $\pi = 1512$
   - Calculate the CS, PS and DWL and sketch a graph illustrating this distribution of welfare.
     A: $CS = 422.5$, $PS = 1521$, $DWL = 162.5$.