1. Suppose the demand curve is $Q(p) = p^{\epsilon}$, what is the elasticity of demand? If marginal cost is \$1 and $\epsilon = -2$, what is the profit-maximizing price?

$\mathcal{E}_{Q,P} = \frac{\%\Delta Q}{\%\Delta P} = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$

$Q = P^{-2}$

$\frac{\Delta Q}{\Delta P} = -2P^{-3}$

$\mathcal{E}_{Q,P} = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} = -2P^{-3} \times \frac{P}{P^{-2}}$

$= -2P^{-3} \times P^{3}$

$= -2$

substitude $Q = \frac{1}{4}$ into $Q = P^{-2}$

$P^{-2} = \frac{1}{4}$

$\boxed{P = 2}$

Max π ; $MR = MC$

$\frac{1}{2} Q^{-1/2} = 1$

$Q^{-1/2} = 2$

$Q = \frac{1}{4}$

$TR = P \cdot Q$

$TR = Q^{-1/2} \cdot Q = Q^{1/2}$

$MR = \frac{1}{2} Q^{-1/2}$

2. Suppose the demand curve for corn is $Q(p) = 10 - p$. Suppose that one firm owns all five units of corn in the world and has zero marginal cost. Does a monopoly sell less output than would be sold in a competitive market in which 100 firms each own 0.05 units?

$TR = Q(-Q + 10)$

$TR = -Q^2 + 10Q$

$MR = -2Q + 10$

$MR = MC$

$-2Q + 10 = 0$

$\boxed{Q_M = 5}$

Monopoly should sell at $Q = 5$

Total outputs in competitive market is $100(0.05)$ $\boxed{Q_C = 5}$

Both market have sell outputs at the same level (5 unit)

8. Output is homogenous and the demand curve is

$$P = 448 - Q.$$

There are two firms with identical costs given by $C = q_i^2$ where q_i is the production of firm i. The marginal cost of firm i is $MC_i(q_i) = 2q_i$.

(a) Find the Cournot equilibrium firm outputs.
(b) Find the Stackelberg equilibrium firm outputs.

3. Problem 8, Chapter 13 in Church and Ware (2000) (Church and Ware (2000) is an e-book and is available online).

Cournot equilibrium

Firm 1; $\pi = P \cdot q_1 - q_1^2$

$\pi = (448 - q_1 - q_2) \cdot q_1 - q_1^2$

$\pi = 448q_1 - q_1^2 - q_2 q_1 - q_1^2$

$\frac{\partial \pi}{\partial q} = 448 - 2q_1 - 2q_1 - q_2 = 0$

$\boxed{-4q_1 + 448 = q_2}$

Firm 2; $\pi = P \cdot q_2 - q_2^2$

$\pi = (448 - q_2 - q_1) q_2 - q_2^2$

$\pi = 448q_2 - q_2^2 - q_1 q_2 - q_2^2$

$\frac{\partial \pi}{\partial q_2} = 448 - 2q_2 - q_1 - 2q_2 = 0$

$-4q_2 = q_1 - 448$

$\boxed{q_1 = -4q_2 + 448}$

$q_1 = -4(-4q_1 + 448) + 448$

$q_1 = 16q_1 - 1792 + 448$

$q_1 = 16q_1 - 1344$

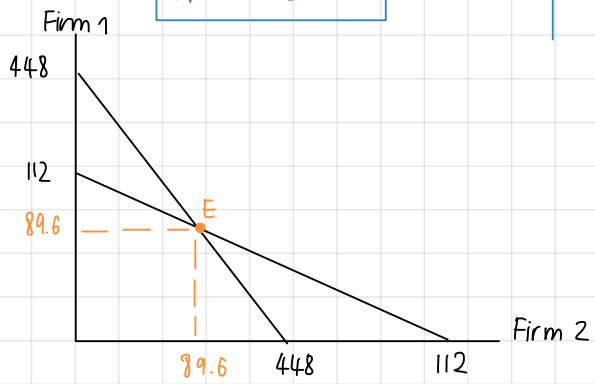
$-15q_1 = -1344$

$\boxed{q_1 = 89.6}$

$q_2 = -4(89.6) + 448$

$= -358.4 + 448$

$\boxed{q_2 = 89.6}$



stackelberg Equilibrium

Assume that firm 1 moves first

Firm 2; $\pi = P(q_1, q_2) q_2 - q_2^2$

$= (448 - q_1 - q_2) q_2^2$

$= 448q_2 - q_2^2 - q_1 q_2 - q_2^2$

$= 448q_2 - 2q_2^2 - q_1 q_2$

$\frac{\partial \pi}{\partial q_2} = 448 - 4q_2 - q_1 = 0$

$\boxed{q_2 = 112 - \frac{1}{4} q_1}$

Firm 1: $\pi = P(q_1, q_2) q_1 - q_1^2$

$= (448 - q_1 - 112 + \frac{1}{4} q_1) q_1 - q_1^2$

$= (336 - \frac{3}{4} q_1) q_1 - q_1^2$

$= 336q_1 - \frac{3}{4} q_1^2 - q_1^2$

$= 336q_1 - \frac{3}{4} q_1^2$

$\frac{\partial \pi}{\partial q_1} = 336 - \frac{7}{2} q_1 = 0$

$\boxed{q_1 = 96}$

$q_2 = 112 - \frac{1}{4}(96)$

$\boxed{q_2 = 88}$

4. (write about 0.5 page) Find 1 example of an industry that has a dominant firm. Describe what this industry is, which firm is the dominant firm, which firms are fringe firms (name the ones that you

Telecommunication industry is made up of companies that make communication possible on a global scale, whether it is through the phone or the internet, through airwaves or cables, through wires or wirelessly. These companies created the infrastructure that allows data in words, voice, audio, or video to be sent anywhere in the world. The largest companies in the sector are telephone (both wired and wireless) operators, satellite companies, cable companies, and internet service providers. For example, I choose AIS (advanced info Service) to be a dominant firm in telecommunication industry in Thailand. Advanced info Service Public Company Limited (AIS) is Thailand's largest GSM mobile phone operator with 39.87 million customers. AIS started off as a computer rental business. In October 1990, it launched analog 900 MHz mobile phone services with a 20-year monopoly concession from the Telephone Organization of Thailand (TOT) and later became the first company allowed to operate on the GSM-900 frequency. The fringe firm in this sector is LINE MOBILE or Finn Mobile is a division by Line Corporation operates mobile virtual network operator service in Japan and Taiwan, while in Thailand it operates as a light MVNO service provide structure by DTAC. DTAC is the nation's third GSM phone company, after AIS and TRUE.