

Final

Q1

a) True.

b) Advertising.

c) ~~Decrease~~ Ambiguous.

d) Increase.

e) Ambiguous.

f) broad.

g) 3400.

h) 0.

i) 10000

j) ~~20~~ $\hat{n} = (a-c) \frac{1}{\sqrt{F}} - 1 = \frac{20-2}{\sqrt{2}} - 1 = 11.72 \approx 11$

k) $\hat{n} = 8.89 \Rightarrow 8$ $p = \frac{a+nc}{n+1} = \frac{15+8 \times 1}{9} = 2.56$

l) True.

m) Less competition.

n) R & D.

o) Cost efficiency.

100%

unit

(a)

unit

(d)

unit

unit

(c)

unit

(b)

unit

(e)

unit

(f)

unit

(g)

unit

(h)

unit

(i)

$$100\% = 1 - \frac{5}{100} = 0.95 = 1 - \frac{1}{1.05} = 1 - \frac{1}{1.05} = 0.95$$

(j)

$$100\% = 1 - \frac{5}{100} = 0.95 = 1 - \frac{1}{1.05} = 1 - \frac{1}{1.05} = 0.95$$

(k)

unit

(l)

unit

(m)

unit

(n)

unit

(o)

①

Q2.

$$S: q_s = 80 - 2p_s$$

$$ns: q_{ns} = 85 - p_{ns}$$

a) Let $q_s + q_{ns} = q$; $p_s = p_{ns} = p$

If $p \geq 40 \Rightarrow q_s = 0$

Demand:

$$q = 85 - p \quad \text{if } p \geq 40$$

$$q = 165 - 3p \quad \text{if } p < 40$$

Marginal revenue:

$$MR = 85 - 2q \quad \text{if } q \leq 40$$

$$MR = 55 - \frac{2q}{3} \quad \text{if } q > 40$$

Case 1: $q \leq 40$

$$85 - 2q = 15 \Rightarrow q = 30 \Rightarrow p = 55$$

$$\text{Profits} = 55(30 - 15) = 30[55 - 15] = 1200$$

Case 2: $q > 40$

$$55 - \frac{2q}{3} = 15 \Rightarrow q = 120 \Rightarrow p = 15$$

$$\text{Profits} = 15[120 - 120] = 120[15 - 15] = 0$$

$$q = 60 \Rightarrow p = 35$$

$$\text{Profits} = 60[35 - 15] = 1200$$

Indifferent

①

Q3

$$\pi_2 = q_2(100 - q_1 - q_2)$$

S/D

(a)

$$\frac{\partial \pi_2}{\partial q_2} = 0: 100 - q_1 - 2q_2 = 0$$

$$\Rightarrow q_2 = 50 - \frac{q_1}{2}$$

Problem of F1:

$$\pi_1 = q_1(100 - q_1 - q_2(q_1)) - q_1^2$$

$$0 < q_1 < 50 + \frac{q_1}{2} \Rightarrow \left[100 - q_1 - 50 + \frac{q_1}{2} \right] q_1 - q_1^2$$

$$= \left(50 - \frac{q_1}{2} \right) q_1 - q_1^2$$

$$\frac{\partial \pi_1}{\partial q_1} = 0: 50 - q_1 = 0$$

$$\Rightarrow q_1 = 50$$

$$q_1 = 50 \Rightarrow q_2 = 50 - \frac{50}{2} = 25$$

$$q_1 = 50, q_2 = 25 \Rightarrow \pi_1 = 50(100 - 50 - 25) - 50^2 = 1250$$

$$\pi_2 = 25(100 - 50 - 25) = 1250$$

$$q_1 = 50, q_2 = 25 \Rightarrow \pi_1 = 1250, \pi_2 = 1250$$

Conclusion

①

⑥

In order for firm 2 to enter, we need

$$\pi_2(q_1) \geq 0$$

$$[100 - q_1 + q_2(q_1)] q_2 - 16 \geq 0$$

$$[100 - q_1 - 50 + \frac{q_1}{2}] [\frac{50 - q_1}{2}] - 16 \geq 0$$

$$\left[50 - \frac{q_1}{2} \right]^2 \geq 16$$

$$\Rightarrow 50 - \frac{q_1}{2} \geq 4$$

$$46 \geq \frac{q_1}{2}$$

$$\boxed{92 \geq q_1}$$

$$\left[\left(\frac{q_1}{2} + 50 \right) - q_1 \right] q_1 - 16 \geq 0$$

$$0 = q_1 - \frac{q_1^2}{2} + 50q_1 - 16 = \frac{100q_1 - q_1^2 - 32}{2}$$

$$\frac{100q_1 - q_1^2 - 32}{2} \geq 0$$

$$\frac{100q_1 - q_1^2 - 32}{2} \geq 0$$

Q4

we have a shift of the demand

a) Marginal Consumer.

$$p_1 + x = p_2 + (0.6 - x)$$

$$2x = p_2 + 0.6 - p_1$$

$$x = \frac{p_2 - p_1}{2} + 0.3$$

Demands

$$q_1 = 100 \left[0.3 + \frac{p_2 - p_1}{2} \right]$$

$$q_2 = 100 \left[0.7 + \frac{p_1 - p_2}{2} \right]$$

b)

1st problem

$$\pi_1 = p_1 q_1 = p_1 \left[100 \left(0.3 + \frac{p_2 - p_1}{2} \right) \right]$$

$$\frac{\partial \pi_1}{\partial p_1} = 0 : 0.3 + \frac{p_2 - p_1}{2} = 0$$

$$\Rightarrow p_1(p_2) = 0.3 + \frac{p_2}{2}$$

Analogously:

$$p_2(p_1) = 0.7 + \frac{p_1}{2}$$

(3).

Subbing $p_2(p_1)$ into p_1 .

$$p_1 = 0.3 + \left(0.7 + \frac{p_1}{2}\right)$$

$$p_1 = 0.3 + \frac{1.4 + p_1}{2}$$

$$4p_1 = 1.2 + 1.4 + p_1$$

$$\Rightarrow p_1 = \frac{2.6}{3} \quad \Rightarrow p_2 = 0.7 + \frac{2.6}{6}$$

$$p_1 = 0.867 \quad p_2 = 1.13$$

$$d = \frac{2}{2-0} = \frac{2}{2-1}$$

$$20x + p = 2x + p$$

$$x + p < d$$

Q5

a)

Payoff under (T, L) : $8 + \delta 8 + \delta^2 8 + \dots = \frac{8}{1-\delta}$

$$8 + \delta 8 + \delta^2 8 + \dots = \frac{8}{1-\delta}$$

Deviation Payoff:

$$9$$

To sustain:

$$\frac{8}{1-\delta} > 9 \Rightarrow 8 > 9 - 9\delta$$

$$\Rightarrow 8 > \frac{1}{9}$$

b)

Payoff TL:

$$\frac{8}{1-\delta} = \frac{8}{0.5} = 16$$

Payoff dev:

$$9 + x8 + x\delta^2 + \dots$$

$$9 + \frac{x8}{1-\delta} = 9 + \frac{x \cancel{0.5}}{\cancel{0.5}}$$

To sustain

$$16 > 9 + x$$

$$\Rightarrow 7 > x$$

Q6)

a) Retailer's prob.

$$MR = MC$$

$$20 - 4q = w$$

$$\Rightarrow \frac{20 - w}{4} = q$$

M's prob:

$$\pi_m = (w - c)q = wq = w \left[\frac{20 - w}{4} \right]$$

$$\frac{\partial \pi_m}{\partial w} = 0 : \frac{20 - 2w}{4} = 0$$

$$\Rightarrow \boxed{w = 10} \Rightarrow \boxed{q = 2.5}$$

$$\pi_m = 10 \times 2.5 = 25$$

$$\pi_r = 2.5 [15 - 10] = 12.5$$

$$\pi_m + \pi_r = 27.5$$

b)

$$\pi_c = (20 - 2q)q - \bar{c}q = (20 - 2q)q$$

$$\frac{\partial \pi_c}{\partial q} = 0 : 20 - 4q = 0$$

$$2q = 5$$

$$\Rightarrow p = 10$$

$$\text{Profits} = 50$$



(02)

DM : DM

$$\omega = 9.42 \times 10^3 \text{ rad/s}$$

$\rho = \frac{m}{N}$

5049 214

$$P(\omega = 0) = P(\omega = 2\pi) = \frac{1}{2\pi}$$

$$\boxed{2.5 = p} \quad \boxed{0.1 = q}$$

$$2.81 = [0.1 - 2.1] \cdot 0.6$$

589

16