Final

Q1

a) True.

b) Advertising.

c) ~~Decrease~~ Ambigious,

d) Increase.

e) Ambigious.

f) broad.

g) 3400.

h) 0.

i) 10000

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

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

l) True.

m) Less competition.

n) R&D.

o) Cost efficiency.

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:
$q = 85 - p$ if $p \geq 40$
$q = 165 - 3p$ if $p < 40$.

Marginal revenue:

$MR = 85 - 2q$ if $q \leq 40$
$MR = 55 - \frac{2q}{3}$ if $q > 40$.

Case 1: $q \leq 40$.

$85 - 2q = 15 \Rightarrow q = 30 \Rightarrow p = 55$
Profits $= \cancel{55(30-15)} = 30[55-15]$
$= 1200$

Case 2: $q > 40$
$\cancel{165}$ $55 - \frac{2q}{3} = 15 \Rightarrow \cancel{q = 120 \Rightarrow p = 15}$

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

$q = 60 \Rightarrow p = 35$
Profits $= 60[35-15] = 1200$.

Indifferent

Q3

(a)

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

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

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

Problem of F1:

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

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

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

$$\frac{\partial \pi_1}{\partial q_1} = 0 : 50 - q_1 - 2q_1 = 0$$

$$\Rightarrow q_1 = \frac{50}{3}$$

①

ⓑ In order for firm 2 to enter, we need

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

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

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

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

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

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

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

Q4

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) 1's problem

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

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

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

Analogously:

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

(3).

Subbing $p_2(p_1)$ into p_1

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

$$p_1 = 0.3 + \frac{1.4 + p_1}{4}$$

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

$$\Rightarrow p_1 = \frac{2.6}{3} \approx 0.867 \quad \Rightarrow p_2 = 0.7 + \frac{2.6}{6} \approx 1.13$$

Q5

a) Payoff under (T, L):

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

Deviation Payoff:

$$9$$

To sustain:

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

b) Payoff TL:

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

Payoff devn:

$$9 + x\delta + x\delta^2 + \ldots$$

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

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) $\pi_c = (20-2q)q - \overset{0}{\tilde{c}}q = (20-2q)q$

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

$\Rightarrow q = 5 \Rightarrow p = 10.$

Profits = 50.