

# MICROECONOMICS COMPREHENSIVE EXAM

January 1990

(SOLUTIONS)

#21

#21 ①  $x = 20 - p$  ;  $X = 100x = 2000 - 100p$  ;  $p = 20 - \frac{1}{100}X$ .

(a)  $R_1(q_1, q_2) = pq_1 = (20 - \frac{1}{100}(q_1 + q_2))q_1 = 20q_1 - \frac{1}{100}q_1^2 - \frac{1}{100}q_1q_2$

$\pi_1(q_1, q_2) = R_1(q_1, q_2) - C_1(q_1) = R_1(q_1, q_2) - 8q_1$

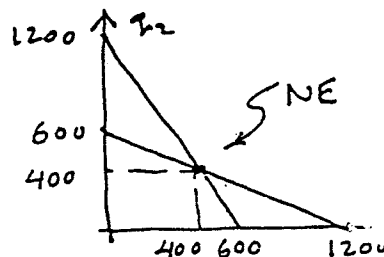
$\frac{\partial \pi_1}{\partial q_1} = MR_1 - MC_1 = 20 - \frac{2}{100}q_1 - \frac{1}{100}q_2 - 8 = 12 - \frac{2}{100}q_1 - \frac{1}{100}q_2$

$\frac{\partial \pi_2}{\partial q_2} = 12 - \frac{1}{100}q_1 - \frac{2}{100}q_2$

SIMULTANEOUS SOLUTION OF

$\frac{\partial \pi_1}{\partial q_1} = \frac{\partial \pi_2}{\partial q_2} = 0 :$

$q_1 = q_2 = 400$  ← NE



$q_1 = 600 - \frac{1}{2}q_2$   
 $q_2 = 600 - \frac{1}{2}q_1$

$X = 800$  ,  $p = 12$  ;  $x_i = 8$  ,  $y_i = 120 - 96 = 24$  (i A CONSUMER)  
 $x_i = 0$  ,  $y_i = \pi_i = 4800 - 3200 = 1600$  (i A PRODUCER)

(b) COMPETITIVE OUTCOME:  $p = MC = 8$  ;  $\therefore x = 12$  ,  $X = 1200$  ;

$q_1 + q_2 = X = 1200$  ;  $\pi_1 = \pi_2 = (p - MC)q_i = 0$  ;

CONSUMERS:  $x_i = 12$  ,  $y_i = 120 - 96 = 24$ .

THIS IS NOT A PARETO IMPROVEMENT UPON (a) BECAUSE THE

TWO PRODUCERS ARE WORSE OFF:  $\pi^a = 1600$  ,  $\pi^b = 0$ .

CONSUMERS'  $u_i$  IN (a) :  $u^a = 24 - \frac{1}{2}(8)^2 + (20)(8) = 24 - 32 + 160 = 152$

CONSUMERS'  $u_i$  IN (b) :  $u^b = 24 - \frac{1}{2}(12)^2 + (20)(12) = 24 - 72 + 240 = 192$

WE WILL HAVE A STRICT PARETO IMPROVEMENT IF WE TRANSFER

FROM EACH CONSUMER  $32 < t < 40$  AND GIVE HALF OF THIS TO