Wednesday, November 19, 2014 7:31 PM

LONG RUN PRODUCTION

$Q = F(L, K)$.

NOW L AND K ARE TREATED AS "VARIABLE INPUTS"

A MANAGER FACES W/ COST MINIMIZATION PROBLEM:

MINIMIZE COST OF PRODUCTION $= TC = w \cdot L + r \cdot K$ (WAGE RATE, RENTAL RATE)

SUBJECT TO $Q = \bar{Q}$ (DESIRED OUTPUT LEVEL)

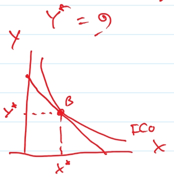
Q: $(L^* = ?,\ K^* = ?) \longrightarrow$ COST IS MINIMIZED.

A CONSUMER

$U(X, Y)$

S.T. $P_x X + P_y \cdot Y = M$

$X^* = ?$
$Y^* = ?$ $\rightarrow$ MAX U.



RATIONAL SPENDING RULE:

$\frac{MU_x}{P_x} = \frac{MU_y}{P_y}$

OR $MRS = \frac{P_x}{P_y}$

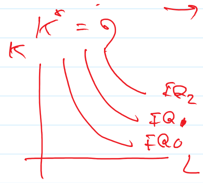
SLOPE OF IC — SLOPE OF BL

A PRODUCER

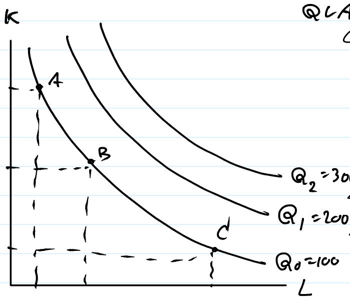
MIN TOTAL COST $= w \cdot L + r \cdot K$

S.T. $Q = \bar{Q}$

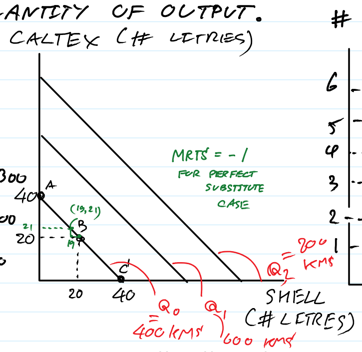
$L^* = ?$
$K^* = ?$ $\rightarrow$ MINIMIZE TC.



ISOQUANT: AN ISOQUANT CURVE REPRESENTS ALL INPUT MIXES THAT GIVE THE SAME QUANTITY OF OUTPUT.



L = AMOUNT OF LABOR
K = AMOUNT OF CAPITAL (OR MACHINE)



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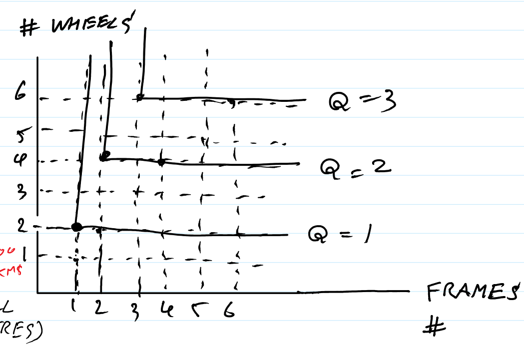
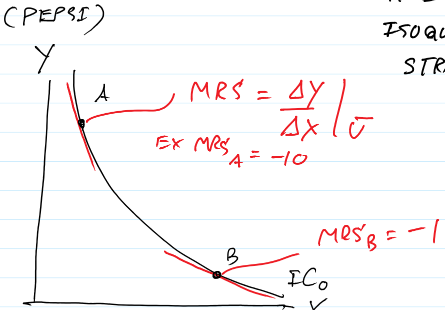
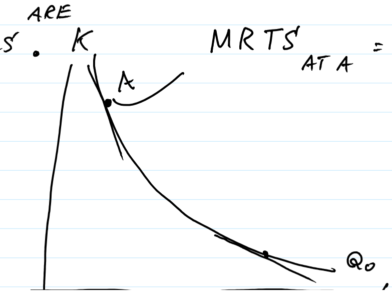
IF THE TWO INPUTS ARE PERFECT SUBSTITUTES, ISOQUANT CURVES ARE STRAIGHT LINES.



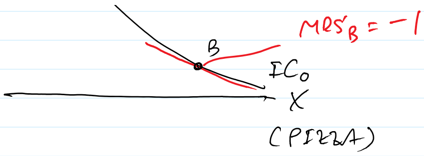
IF THE TWO INPUTS ARE PERFECT COMPLEMENTS, ISOQUANTS ARE L-SHAPED.

(PEPSI)





$MRTS_{AT\ A} = \frac{\Delta K}{\Delta L}\Big|_{Q = Q_0}$



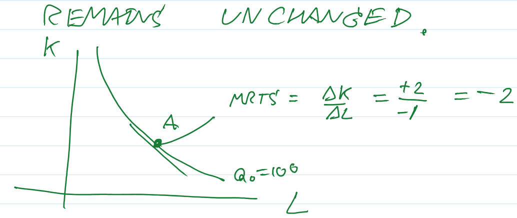
A CONSUMER

A PRODUCER

MRTS = MARGINAL RATE OF TECHNICAL SUBSTITUTION BETWEEN L AND K.

$$= \left.\frac{\Delta K}{\Delta L}\right|_{Q=Q_0}$$

MRTS WILL TELL A MANAGER THAT IF HE USES LESS L, HOW MUCH K HE NEEDS TO ACQUIRE SO THAT HIS OUTPUT REMAINS UNCHANGED.



MORE DETAIL ON $MRTS_{LK}$:

MP_L = MARGINAL PRODUCT OF LABOR.

MP_K = MARGINAL PRODUCT OF CAPITAL

$MP_L = \frac{\Delta Q}{\Delta L}$ => EXTRA OUTPUT RECEIVED FROM AN EXTRA UNIT OF LABOR.

$MP_K = \frac{\Delta Q}{\Delta K}$ => EXTRA OUTPUT RECEIVED FROM AN EXTRA UNIT OF CAPITAL

$w = 100$ BAHT/DAY

$r = 100$ BAHT/DAY

$MP_L = 100$

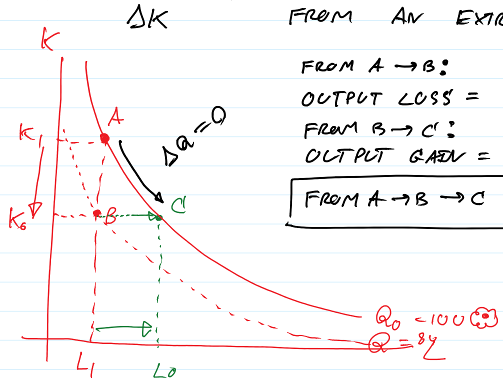
$MP_K = 80$

$\frac{MU_x}{P_x}$ $\frac{MU_y}{P_y}$

$\frac{MP_L}{w} = \frac{100}{100} = 1 > \frac{MP_K}{r} = \frac{80}{100} = 0.8$

$\frac{MP_L}{P_L}$ MARGINAL PRODUCT OF LABOR PER BAHT SPENT ON HIM

$\frac{MP_K}{P_K}$ MARGINAL PRODUCT OF CAPITAL PER BAHT SPENT ON IT.



FROM A → B: 4 −5

OUTPUT LOSS = $MP_K \cdot \Delta K$

FROM B → C: 2 +10

OUTPUT GAIN = $MP_L \cdot \Delta L$

$\boxed{\text{FROM } A \to B \to C = MP_K \cdot \Delta K + MP_L \cdot \Delta L = 0}$

$\Downarrow$

$MP_K \cdot \Delta K = -MP_L \cdot \Delta L$

$$\boxed{\frac{\Delta K}{\Delta L} = \frac{-MP_L}{MP_K}}$$

SO, $MRTS = \frac{\Delta K}{\Delta L} = -\frac{MP_L}{MP_K}$ $\frac{\text{MARGINAL PRODUCT OF LABOR}}{\text{MARGINAL PRODUCT OF CAPITAL}}$

[RECALL THAT, IN CONSUMER CHOICE THEORY, YOU HAVE

$MRS = \frac{\Delta Y}{\Delta X} = -\frac{MU_x}{MU_y}$.]

ISOCOST LINE: AN ISOCOST LINE REPRESENTS ALL INPUT MIXES THAT COSTS A MANAGER THE SAME MONEY

(OR SAME COSTS)

SUPPOSE w = wage rate (BAHT / PERSON / DAY)

[NOTE: w IS JUST A PRICE OF USING LABOR]

r = rental rate (BAHT / MACHINE / DAY)

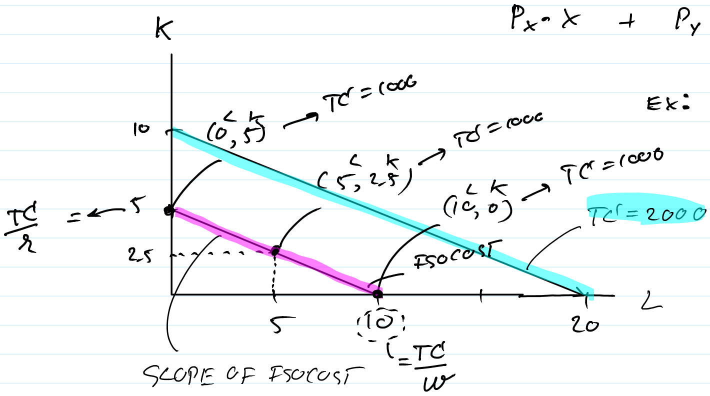
[NOTE: r IS JUST A PRICE OF USING CAPITAL]

TC = total cost (BAHT / DAY)

= (YOUR PAYMENT TO L AND K ALL TOGETHER)

ISOCOST EQUATION: $w \cdot L + r \cdot K = TC$.

[RECALL THAT, IN CONSUMER CHOICE THEORY, WE HAVE
$P_x \cdot X + P_Y \cdot Y = M$.]



Ex: $TC = 1000$ BAHT

$w = 100$

$r = 200$

$\frac{TC}{w} = \frac{1000}{100} = 10$ WORKERS / DAY

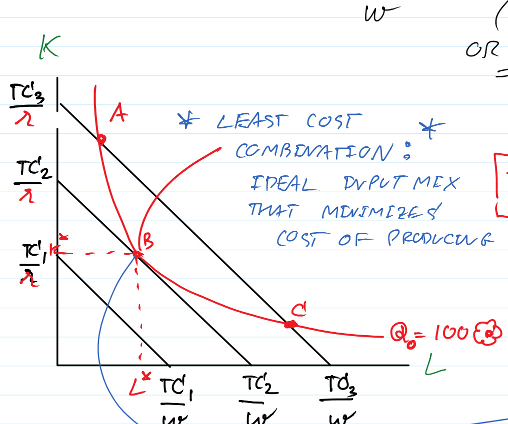
$\frac{TC}{r} = \frac{1000}{200} = 5$ MACHINES / DAY

SLOPE OF ISOCOST

$= -\frac{5}{10} = -\frac{1}{2}$

OR SLOPE OF ISOCOST $= -\dfrac{\frac{TC}{r}}{\frac{TC}{w}} = -\frac{w}{r}$ → RELATIVE PRICE OF LABOR AND CAPITAL

OR $= -\frac{P_L}{P_K}$



* LEAST COST COMBINATION: *
IDEAL INPUT MIX THAT MINIMIZES COST OF PRODUCING $Q_1 = 100$.

$\boxed{TC_3 > TC_2 > TC_1}$

$\boxed{MRTS = \frac{w}{r}}$

OR

$\boxed{\frac{MP_L}{w} = \frac{MP_K}{r}}$