Assignment_Ans Key

Students need to write detailed ansers

1. (**2 marks**) a. Discuss the law of demand. Graph the following demand- supply equations:

$Q_d = 100 - 0.5P$

$Qs = P$

b. Calculate the equilibrium price and quantity. Find the excess demand, if the price is set at \$50.
c. Suppose the government imposes a tax (\$2/unit) on the seller. Determine the new equilibrium price and quantity.
d. Calculate the amount of tax revenue, and show it on a diagram.

2. (**2 marks**) Assume the market demand for wheat is as follows:

$Qd = 45 - 2p + 0.3Y + 1p_b$

where Y refers to income and p_b refers to the price of barley.

i. Assuming that wheat and barley both sell for \$1, and income is \$20, calculate the price elasticity, cross-price elasticity, and income elasticity of demand for wheat.
ii. If income goes up by 50%, what will be the percentage change in quantity demand of wheat?

3. (**2 marks**) Using suitable diagrams and appropriate assumptions, explain why two indifference curves cannot intersect.

4. (**2 marks**) a. For each of the following utility functions, calculate the MRS and explain whether it is diminishing or not:

$$U = 16q_1q_2^3 \cdots\cdots i$$
$$U = \alpha \ln q_1 + (1-\alpha)\ln q_2 \cdots\cdots ii$$
$$U = 10q_1 + 5q_2 \cdots\cdots iii$$
$$U = \min(q_1, q_2) \cdots\cdots iv$$

5. (**2 marks**) Suppose Jason's utility function is as follows: $U = q_1^{0.8}q_2^{0.2}$

i. and his income, Y = \$100, and prices are P_1= \$20 and P_2= \$10; calculate the utility maximizing quantities of q_1 and q_2, and the resulting utility. Show it on a diagram.

ii. if his new income, Y_1= \$150, and prices are the same. Calculate the new level of utility and show it on a diagram.

1 a. Law of Demand (see ch. 2)
assumptions

$Q_d = 100 - .5P$ —— (I)

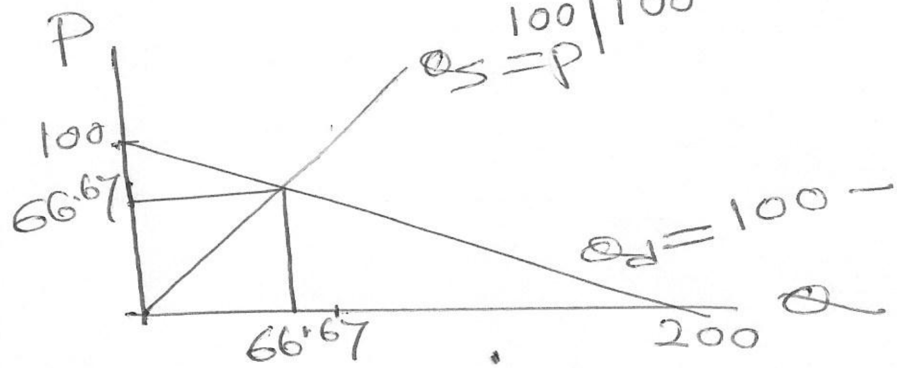
$Q_s = P$ —— (II)

From (I)

Q_d	P
100	0
0	200

From (II)

Q_s	P
0	0
100	100



(b) At equilibrium,

$Q_s = Q_d$

$P = 100 - .5P$

$1.5P = 100$

$P = \frac{100(\cancel{10}\ 2)}{\cancel{15}\ 3} = \frac{200}{3} = \$66.67$

$Q = \frac{200}{3} = 66.67$ units

① c. To asses impacts of tax, use inverese supply-demand functions:

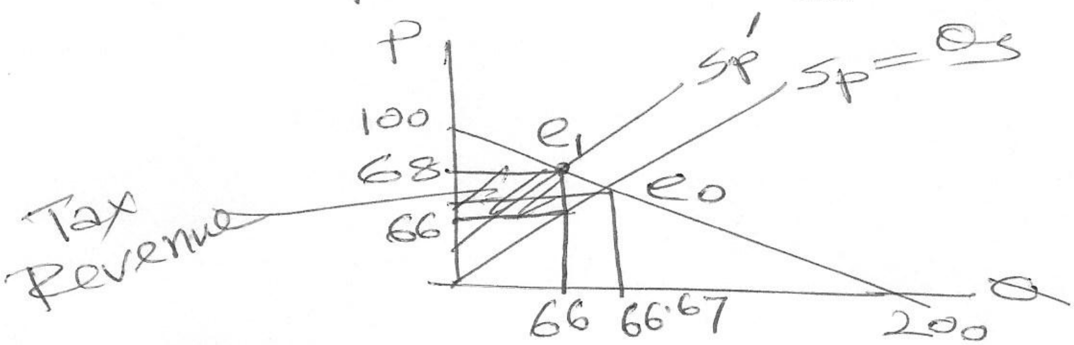
$P = Q_S$

$S_P = Q_s$

$S'_P = S_P + 2 = 2 + Q_S$

$\cdot 5P = 100 - Q_d$

$D_P = 200 - 2Q_d$



With tax, at equilibrium

$Q \quad S'_P = D_P$

$Q + 2 = 200 - 2Q$

$3Q = 198$

$Q = 66$ units

Price paid by the consumer

$S'_P = 2 + 66 = \$68$

Price received by the producer $= \$66$

1 (d) → Tax revenue $= 2(66) = \$132$ shaded area on the graph.

(2)

$Q_d = 45 - 2P + .3Y + 1P_b$

(1) solve for

$Q = 45 - 2(1) + .3(20) + 1(1)$

$= 50$ units

$\epsilon_{QP} = \frac{dQ}{dP} \cdot \frac{P}{Q} = -2 \frac{1}{50} = -0.04$

$\epsilon_{Q,P_b} = \frac{dQ}{dP_b} \cdot \frac{P_b}{Q} = 1 \frac{1}{50} = 0.02$

$\epsilon_{Q,Y} = \frac{dQ}{dY} \cdot \frac{Y}{Q} = .3 \frac{20}{50} = 0.12$

(~~b~~) (11)

$\epsilon_{QY} = 0.12 = \frac{\% \Delta Q}{\% \Delta Y}$

$\therefore \% \Delta Q = 0.12 \% \Delta Y$

$= 0.12(50)$

$= 6\%$

$\therefore$ A 50% increase in income will ~~re~~raise demand for wheat by 6%.

(3) See Ch.3

Prove that an intersection violates the transitivity and non-satiation assumptions.

(4) $MRS = -\frac{U_1}{U_2} = -\frac{\partial U/\partial q_1}{\partial U/\partial q_2}$

(I) $U = 16 q_1 q_2^3$

$\frac{\partial U}{\partial q_1} = 16 q_2^3$

$\frac{\partial U}{\partial q_2} = 48 q_1 q_2^2$

$\therefore MRS = -\frac{16 q_2^3}{48 q_1 q_2^2} = -\frac{1}{3}\frac{q_2}{q_1}$

As q_1 goes up, $\frac{q_2}{q_1}$ would drop. $\therefore$ the MRS is diminis

(II) $U = \alpha \ln Q_1 + (1-\alpha)\ln Q_2$

$MRS = -\frac{\frac{\alpha}{Q_1}}{\frac{(1-\alpha)}{Q_2}}$

$= -\frac{\alpha}{(1-\alpha)} \cdot \frac{Q_2}{Q_1}$

$\therefore$ MRS is diminishing same as (I).

(iii) $U = 10q_1 + 5q_2$

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

if q_1 goes up MRS stays the same (-2)

$\therefore$ MRS is constant (not diminishing)

(iv) $U = \min(q_1, q_2)$

$$MRS = -\frac{0}{0} = -0$$

$\frac{\partial U}{\partial q_1} = 0$ if q_1 goes up keeping q_2 constant U does not change.

$\therefore$ MRS is constant (not diminishing.

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At equilibreium

$$MRS = MRT$$

$$U = q_1^{.8} q_2^{.2}$$

$$MRS = -\frac{.8 q_1^{-.2} q_2^{.2}}{.2 q_1^{.8} q_2^{-.8}} = -\frac{4 q_2}{q_1}$$

$$MRT = -\frac{P_1}{P_2} = \frac{-20}{20}$$

or

Maximize

$$L = q_1^{.8} q_2^{.2} + \lambda [100 - 20q_1 - 20q_2]$$

Us F.O.C

$$\frac{4 q_2}{q_1} = \frac{20}{20} \qquad q_1 = 4q_2$$

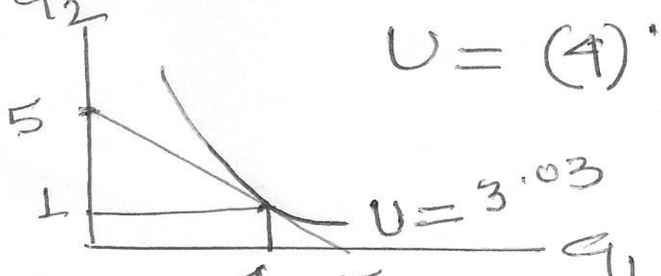
$$20q_1 + 20q_2 = 100$$

$$80 q_2 + 20 q_2 = 100$$

$$q_2 = 1, \quad q_1 = 4$$

$$U = (4)^{.8}(1)^{.2} = (3.03)1$$

$$= 3.03$$



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P8/8

$$Y = 150$$

$$20q_1 + 20q_2 = 150$$

$\because q_1 = 4q_2$; $80q_2 + 20q_2 = 150$

$$q_2 = 1.5 \text{ units}$$

$$q_1 = 4(1.5) = 6 \text{ units}$$

$$U = (6)^{.8}(1.5)^{.2}$$

$$= (4.19)(2.25)$$

$$= 9.43$$