Question-1

The Health Ministry is evaluating the data of the soft beverages market.

Demand function: QD=290−5P — ①

Supply function: QS=−60+5P — ②

(a) Find the Total Surplus.

The authority is concerned about the increasing obesity rate in the country. Hence, they have decided to impose a tax of TK 10 per unit on soft drinks.
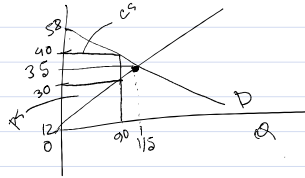
(b) What is the total new consumer surplus and producer surplus after government intervention?

(a) $QD = QS \Rightarrow \boxed{P = 35}$ or

$QD = 290 - 5 \times 35$

Demand Price, $P = \boxed{58} - \dfrac{QD}{5}$

Supply $P = \dfrac{60}{5} + \dfrac{QS}{5}$

$= \boxed{12}$

$T = 0.5 \times 115 \times (58 - 35) + 0.5 \times 115 \times 35 - 12$

$= 2645$

=

(b) $QD = 290 - 5 \times 40$

$ 90$

$QS = -60 + (5 \times 30) = 90$

$PS = \dfrac{1}{2} \times 90 \times (30-12) = 810$

$CS = \dfrac{1}{2} \times 90 \times (58-40) = 810$

Joe mows lawns in his neighborhood for extra money. Suppose the demand for lawn mowing in Joe's neighborhood is: QD = 46 − 2P And that the supply of lawn mowing (Joe's willingness to mow lawns) is: QS = -14 + P The market-clearing price of lawn mowing is $__20__ per lawn and the market-clearing quantity is __6____ lawns. (Enter your responses rounded to two decimal places.) The corresponding consumer surplus is $____9_____.

$46 - 2P = -14 + P$

$\Rightarrow 60 = 3P \Rightarrow P = 20$

$Q = 46 - 40 = 6$

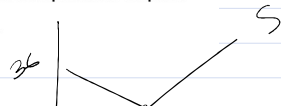$P = \dfrac{46}{2} - \dfrac{QD}{2}$

$= 23$
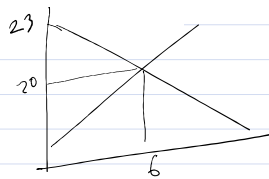
$CS = \dfrac{1}{2} \times 3 \times 6^3 = 9$

Given the demand and supply equations, find the consumer and producer surplus:

a) Demand: P=36-0.35X   Supply: P=0.05X

$v = \dfrac{36}{0.4} = 90$
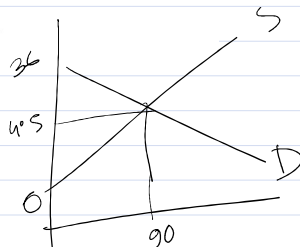
a) Demand: P=36-0.35X   Supply: P=0.05X

$X = \dfrac{36}{0.4} = 90$

$P = 4.5$

$P_D = 36$ $P_S = 0$

$PS = 1417.5$ $CS = 202.5$

Question 4. Suppose that the market for milk can be represented by the following equations:

Demand: $P = 12 - 0.5QD$

Supply: $P = 0.1QS$

where P is the price per gallon, and Q represents the quantity of milk, represented in millions of gallons of milk consumed per day.

a) Calculate the equilibrium price and quantity of milk.

b) To help dairy farmers, the government sets a **minimum price of $2.50** per gallon of milk. What is the new quantity of milk sold in the marketplace?

c) Illustrate your answers to (a) and (b) on a graph. Using this graph, calculate how the consumer surplus and producer surplus change **after** the price supports are enacted. Also calculate any deadweight loss that results.

d) Suppose that the government supports the $2.50 per gallon price by purchasing any excess milk suppliers make available but are unable to sell to consumers. How much milk must the government buy?

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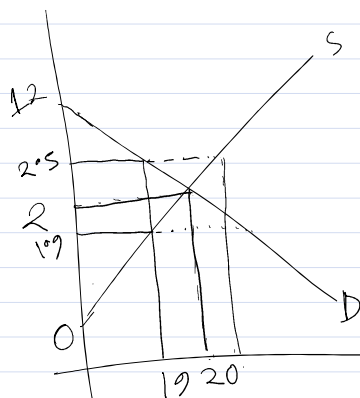a) Calculate the equilibrium price and quantity of milk.

① $\dfrac{12-P}{0.5} = \dfrac{P}{0.1}$

$\Rightarrow 1.2 - 0.1P = 0.5P$

$\Rightarrow P = \dfrac{1.2}{0.6} = \boxed{2}$

$Q = \dfrac{2}{0.1} = \boxed{20}$

ⓑ $QD = \dfrac{12-2.5}{0.5} = \boxed{19}$

$P_{s\,new} = 0.1 \times 19 = 1.9$

ⓒ

① $PS = \dfrac{1}{2} \times (12-2) \times 20$

$= \boxed{100}$

$CS = 0.5 \times 2 \times 20$

$= \boxed{20}$

② $PS = 0.5 \times (12-2.5) \times 19 = \boxed{90.25}$

$CS = 0.5 \times 1.9 \times 19$

$= \boxed{18.05}$

ⓓ $QS = \dfrac{2.5}{0.1}$

$= 25$

$25-19 = \boxed{6}$

$DWL = 0.5 \times (2.5-1.9) \times 1$

$= \boxed{0.3}$

$$= \boxed{0.3}$$

Question 5. Norway has a sugar tax that is a tax paid on chocolate and sugar products that are either imported into Norway or produced in Norway. In 2016 the tax was around 20 Norwegian krone (NOK) per kg. Consider the market for candies in Norway before the introduction of this sugar tax. Market demand and market supply curves are given by the following equation below where P is the price in NOK per kg of candies and Q is the quantity in kg of candies:

Market Demand: P = 125 – (3/8)Q

Market Supply: P = 5 + (1/8)Q

a) Given the above information, find the equilibrium price and quantity in this market.

b) Calculate the values of consumer surplus and producer surplus before the imposition of the tax. Show them graphically in a well-labeled graph.

c) Given this excise tax of 20 Norwegian krone, find the new price consumers will pay for each kg of candies, the new price producers will receive for each kg of candies after they pay the excise tax, and the new equilibrium quantity of kg of candies that will be sold in the market. Show the impact of this excise tax in a well labeled graph.

d) Given this excise tax, calculate the value of consumer surplus with the tax, producer surplus with the tax, tax revenue the government receives from implementing the tax, and the deadweight loss due to the implementation of this excise tax. Show these areas in a well-labeled graph.

(a) $Q_D = \dfrac{P - 125}{(-3/8)} = -\dfrac{P-125}{1} \times \dfrac{8}{3}$

$$= \dfrac{-8P + 1000}{3}$$

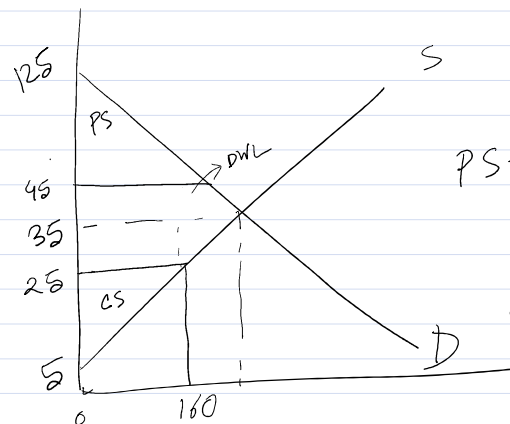$$120 = \left(\dfrac{1}{8} + \dfrac{3}{8}\right) Q$$

$$\Rightarrow Q = 240$$

$$P = 5 + \dfrac{240}{8} = 35$$

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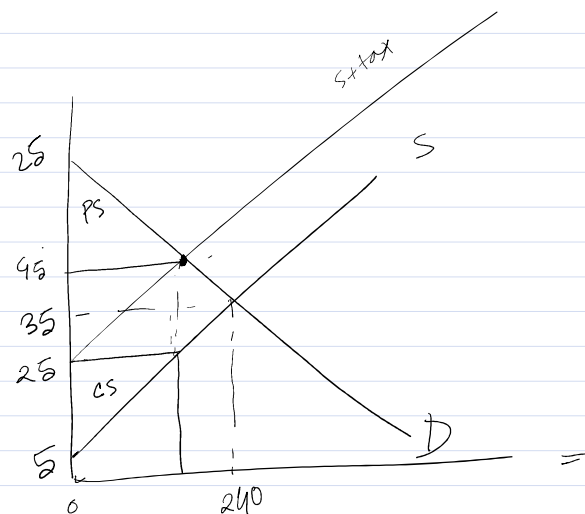

$PS = 0.5 \times (125 - 35) \times 240$
$$= 10800$$

$CS = 0.5 \times 30 \times 240$
$$= 3600$$

(c) $(25-5) \times 8 = 160$

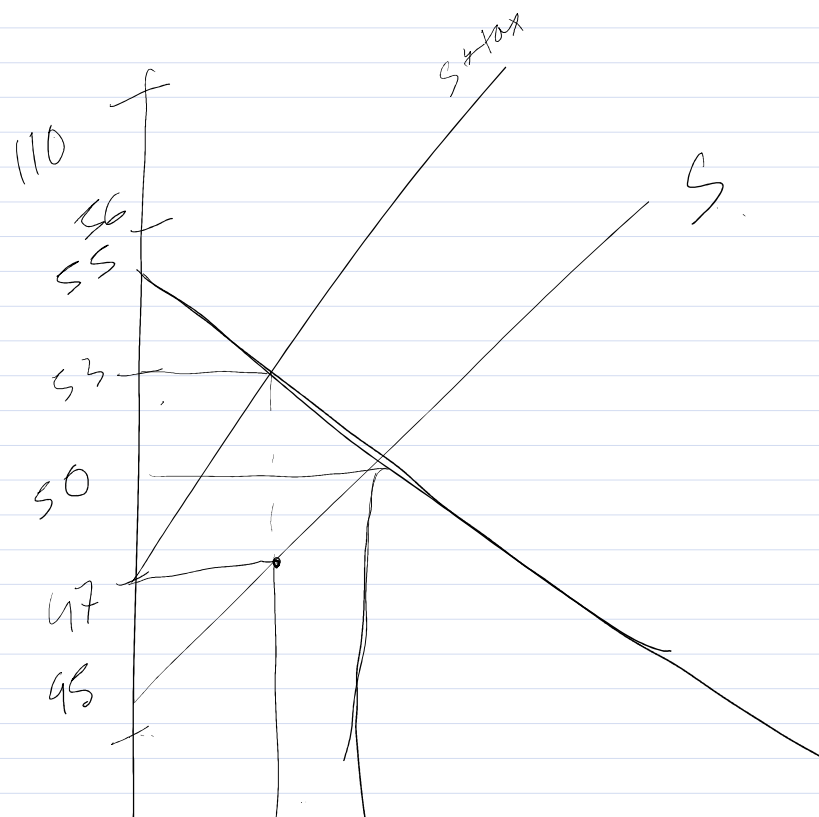$\dfrac{(125 - 45) \times 8}{3} =$

$$\frac{(125 - 45) \times 8}{3} =$$

$$\# \quad eof \; 10 = 6Q$$

$$\text{(a)} \qquad Q = \frac{10}{6} = 1.67$$

$$P = 50.01$$

$$CS = 0.5 \times 1.67 \times 5 = 4.175$$

$$\quad = 4.175$$

$CS = 0 \cdot 1 \cdot$

$PS = 0.5 \times 1.67 \times 5 = 4.175$

1.67
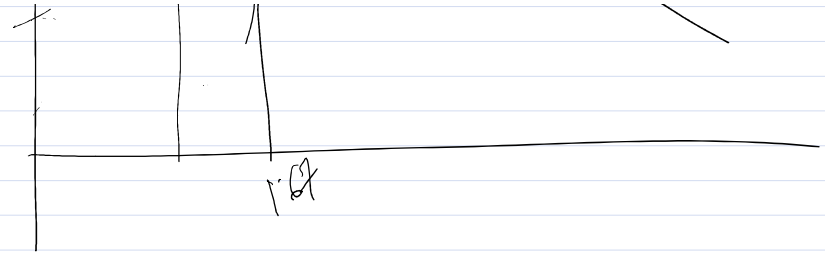
Chapter 7: Welfare and Efficiency [Practice problem]

The Demand and Supply of Grameenphone SIM in Bangladesh is given by the following equations:

P = -16QD + 300 ; Qd is quantity demanded and P is the price per SIM

P = 21Qs + 135 ; Qs is quantity supplied and P is the price per SIM

a) Calculate the **Consumer Surplus** and **Producer Surplus**
b) In the recent Budget, the finance minister has proposed additional tax on the cellular services. If a 7tk tax is imposed on using these services and the tax burden is shared equally by the buyers and sellers, Calculate the after tax **Producer surplus.**
c) Compute the **Government tax revenue**
d) Calculate the **Deadweight loss** to the society after the imposition of tax. Draw an appropriate graph to show the deadweight loss area.
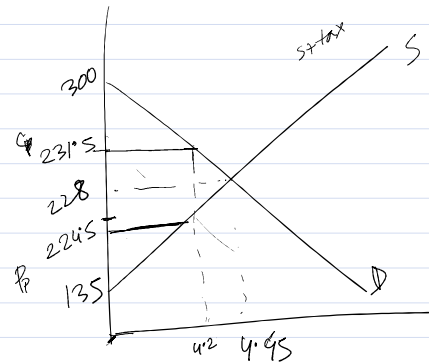
(a)
$Q = 4.459$ $P = 21 \times 4.459 + 135$
          $= 228.639$

$CS = 0.5 \times (300 - 228) \times 4.45$

$= 160.2$

$PS = 0.5 \times (228 - 135) \times 4.45$

$= 206.925$

(b)
$Qs_2 = \dfrac{224.5 - 135}{21} = 4.261$

$Qd_2 = \dfrac{231.5 - 300}{-16} =$
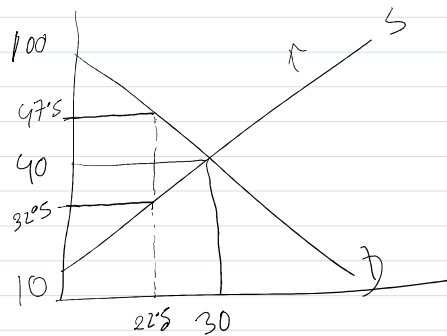
$PS = 0.5 \times (224.5 - 135) \times 4.2$

$= 187.95$

(c) $4.2 \times (231.5 - 224.5)$

© $4.2 \times \left(231.5 - 224.5\right)$

$= 29.4$

ⓓ $0.5 \times \left(4.45 - 4.2\right) \times \left(231.5 - 224.5\right)$

$= 0.875$

Calculate Producer surplus, consumer surplus before tax
producer surplus, consumer surplus, dead weight loss (DWL)
tax revenue to the government after tax:

$$P_d = 100 - 2Q_s$$
$$P_s = 10 + Q_d$$

Suppose the
government
introduces
per unit tax of
$t = 15$ on
producers

ⓐ $\dfrac{3\cancel{90}}{\cancel{3}} = Q$ | $P = 40$

$Q = 30$

$PS = 900$
$CS = 450$

100

47.5

40

32.5

10

22.5 30

ⓑ Aftertax:

$Q_1 = 22.5$
$Q_2 = 26.25$

which one
to take

$PS = 0.5 \times \left(32.5 - 10\right) \times 22.5$

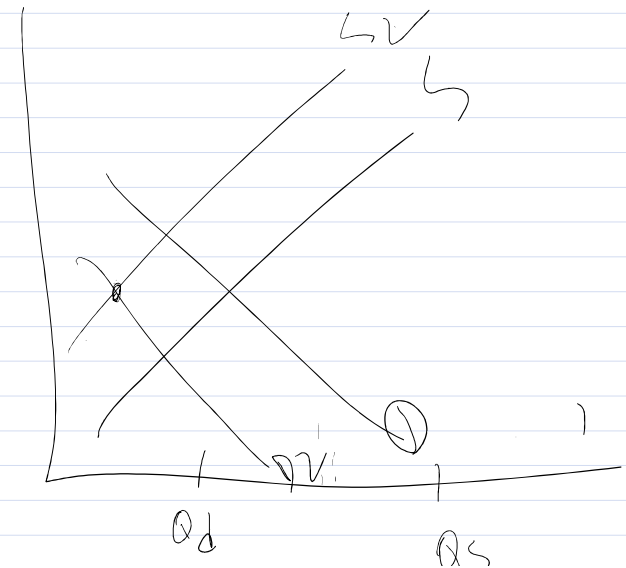$CS = 0.5 \times 22.5 \times \left(100 - 97.5\right)$

(b) After tax:
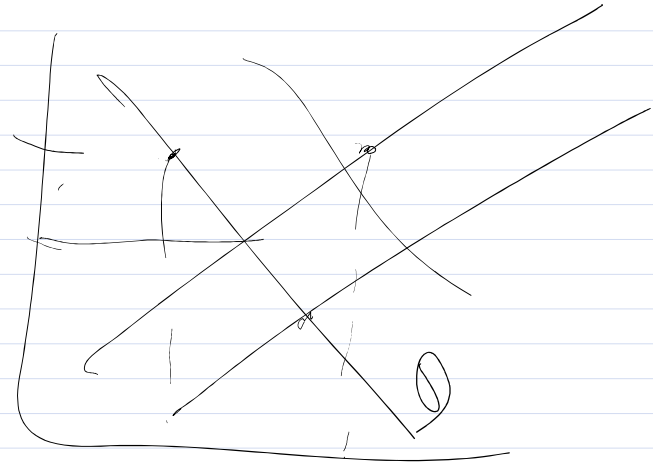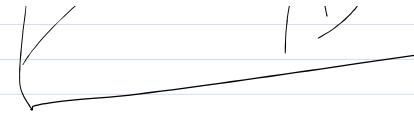
$Q_1 = 22.5$
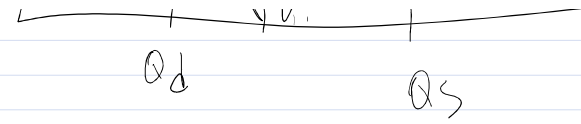
$Q_2 = 26.25$

which one to take →

$$PS = 0.5 \times (32.5 - 10) \times 22.5$$

$$CS = 0.5 \times 22.5 \times (100 - 97.5)$$

Q_d Y U_i Q_s

Elasticity

Q3. If the price of honey rises from Tk. 45 per 250 grams to TK. 55 per 250 grams per pack and as a result the consumer's demand for sugar increases from 600 to 800 packs then find the cross elasticity of demand of honey for sugar. State the relationship between the two goods.

Price Elasticity of Supply

Q4. Given the following data for the supply and demand of movie tickets, calculate the price elasticity of supply when the price changes from $9.00 to $10.00.

Price	Quantity Demanded	Quantity Supplied
$7	100	25
$8	90	45
$9	75	75
$10	55	105
$11	30	125

Honey P
45 —— 55

Sugar QD   600 > 800

$$\Delta Q = \frac{200}{240000} \times 100$$

$$= \frac{1}{12} \%$$

$$\Delta P = \frac{10}{50} \times 10 = 2\%$$

$$\frac{\frac{1}{12}}{2} = 0.0241 \quad + \text{Substitute}$$

PES:

$$\Delta P = \frac{1}{9.5} \times 100 = 10.52\%$$

$$\Delta Q = \frac{30}{903} = 33.33\%$$

$$= 3.1856 \quad \checkmark \text{ elastic good}$$

Q5:

1. $P = 500 - 3QD$; where P is price and QD is Quantity demanded of a normal good

   i. If the income level increases from 10,000 BDT to 15,000BDT then what would happen to the overall demand?

Q6. If the PES is 2.0 for pen drives: and the firm supplied 4,000 when the price was £40. If the price increased from £40 to £46, what would be the new Q?
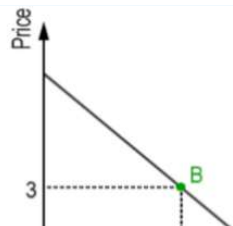
$$\Delta P = \frac{6}{\left(\frac{4+46}{2}\right)} \times 100 = 24$$

$$\Delta Q = \frac{Q_2 - \frac{4000}{1}}{\left(\frac{Q_2 + 4000}{2}\right)} \times 100$$

$$= \frac{2Q_2 - 8000}{Q_2 + 4000} \times 100 = \frac{200Q_2 - 8,00,000}{Q_2 + 4000} \times \frac{1}{24} = 2$$
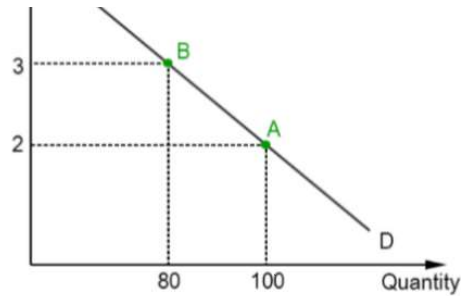
$$\Rightarrow 200Q_2 - 8,00,000 = 48Q_2 + 192000$$

$$\Rightarrow Q_2 = 6526.32$$

Price / B / 3

Quickonomics

	A	B
Q	100	80
P	2	3

Calculate the Price elasticity of demand (PED) if we move from point A to point B.

$$P \quad | \quad 2 \quad | \quad s$$

$$\Delta Q = \frac{80 - 100}{\left(\frac{80 + 100}{2}\right)} \times 100 = -22.22$$

$$\Delta P = \frac{1}{5/2} \times 100$$

$$= 40$$

$$PED = \boxed{\frac{22.22}{40}}$$

$$= 0.555$$

inelastic
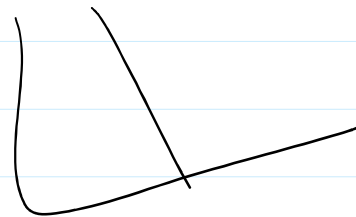
Question: Yesterday the price of envelopes was $3 a box, and Julie was willing to buy 10 boxes. Today, the price has gone up to $3.75 a box and Julie is now willing to buy 8 boxes. What kind of demand is Julie's demand for an envelope? Explain.

$$-2 \qquad \times 100$$

$$\Delta Q = \frac{-2}{18/2} \times 100$$

$$= -22.22$$

P	3	3.75
Q	10	8

$$\Delta P = \frac{0.75}{\left(\frac{3.75+3}{2}\right)} \times 100$$

$$PED = \frac{22.22}{22.288}$$

$$= 0.9962$$

Quantity demand will respond proportionately to a change in price.

Question: If Neil's elasticity of demand for hot dogs is constantly 0.9 and he buys 4 hot dogs when the price is \$1.50 per hot dog. How many will he buy when the price is \$1.00 per hot dog? (using the percentage change formula)

$$\Delta P = \frac{-0.5}{2.5/2} \times 100$$

P	1.50	1.00
Q	4	Q_2

$$= -40$$

$$0.9 \times 40 = 36$$

$$= \frac{Q_2 - 4}{\frac{Q_2 + 4}{2}} \times 100$$

$$= 2\frac{Q_2 - 8}{Q_2 + 4} \times 100$$

$$-0.36 Q_2 - 1.44 = 2Q_2 - 8$$

$$= \frac{8 - 1.44}{2 + 0.36} = Q_2$$

$$\Rightarrow Q_2 = 2.779$$

$$\Delta P = \frac{52000 - 45000}{48500}$$

$$= 14.43$$

$$Q_1 = x$$
$$Q_2 = \frac{125x}{100}$$

$$\frac{0.25x}{1.125x}$$

$$\Delta Q = 22.22$$

1.54∅ in elastic

Q3. In 30 minutes, Kana can either make miso soup or she can clean the kitchen. In 15 minutes, Mitchell can make miso soup; it takes Mitchell an hour to clean the kitchen. Fill in the blanks.

i.Mitchell has the absolute and comparative advantage at __soup__.
ii. Kana has the absolute and comparative advantage at __kitchen__.

Soup   kitchen   30 min

Kana   1 (1)   1 (1)

Mitchell 2 (0.25)   ½ (4)   2 — ½   ½ — 2
                                   1 — ¼   1 — 4

③

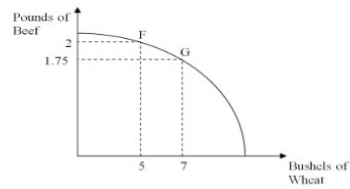|	X	Rice
A	100 (0.5)	50 (2)
B	50 (3)	150 (0.33)

1)   50

(3)   (0.33)

Use the figure below to answer the following question. Assume that the Canadian agricultural land is used either to raise cattle for beef or to grow wheat. The figure below represents the production possibility frontier for beef and wheat. Determine the opportunity cost of moving from

   a) F to G

   b) G to F

$$FG \ OC = \frac{2 - 1.75}{7 - 5} = 0.125$$

$$GF \ OC = \frac{2}{} = 8$$

Q7:

Sarah and James are siblings. Their parents want 12 windows on the house washed and the 25 square yards of leaves raked. Sarah and James estimate their output as shown in the following table.

	Windows per hour	Square yards of leaves per hour
Sarah	4 1.5	6 0.67
James	3 1.67	5 0.6

$4 \dfrac{-6}{1}$

a) Is Sarah going to specialize in raking leaves? Why or why not?

No

$3 + 5 = 8$

Q1) Alice has found herself on a desert island and must gather supplies to survive. Alice has 8 hours of useful stamina that she can use towards gathering firewood or coconuts. She finds that she can gather 1 bundle of firewood every two hours, or 6 coconuts every 4 hours.

a) In terms of a number of coconuts, what is the opportunity cost of 1 bundle of wood? What is the opportunity cost of 12 coconuts in terms of bundles of wood?

b) Bob just crash landed on the island too. He doesn't have quite the stamina that Alice does so he can only work 6 hours a day. He finds that he can gather a bundle of wood in 2 hours or 1 coconut per hour. What is his opportunity cost for 1 bundle of wood? What is the opportunity cost of 6 coconuts in terms of bundles of wood?

c) Who has the absolute advantage in the production of firewood and coconuts, respectively? (In this case, we will say a person has the absolute advantage in the production of a good if he or she produces more when devoting all available resources to the production of that good, so compare Alice spending all 8 of her hours on each with Bob spending all 6 of his hours.)

Ⓐ

$2 = 1bw$
$1 = \frac{1}{2}bw$

$4 = 6C$
$1 = \frac{6}{4}C$
$= \frac{3}{2}C$

$\therefore 2 = 3C$

$1bw \rightarrow 3C$

$3C \rightarrow 1bw$

$> 12C \quad \dfrac{12}{3} = 4$

ⓑ $2 - 1bw$ | $\begin{array}{l} 1 - 1C \\ 2 - 2C \end{array}$

ⓑC $2C - 1bw$
$6C = \boxed{3bw}$

Recuntiy

(RG) $2c - 1$
       $6c = 32v$

(C)

	fw	Corn
A	4	12
b	3	6

After mid

$$\frac{2V_0 - 1.4}{0.25} + \frac{V_0 - 5}{100} = 0$$

$$\frac{200V_0 - 140 + 0.25V_0 - 1.25}{25} = 0$$

$$\Rightarrow V_0 =$$