

**Problem Set 1**

Problem sets submitted after 9 am will not be graded.

**Section I (5 points)**

Fill in the blanks below.

1. **Opportunity cost** is the highest valued alternative that must be given up to engage in an activity.
2. According to **Adam Smith**, markets, run by self-interested people, push society toward desirable ends.
3. Economists look at **income per capita**, to give nation/states long run performance assessments.
4. A market with few government restrictions on how a good or service can be produced or sold or on how a factor of production can be employed is called a **free market**.
5. A **recession** is defined as two or more consecutive quarters of negative growth of real GDP.

**Section II (25 points)**

Consider the following monthly data on employment for the country of Stormlands:

Month	Employment (thousands)
December	9,452.5
January	9,465.2
February	9,472.9
March	9,498.3
April	9,516.3
May	9,539.5
June	9,553.8
July	9,574.8

1. **(3 points)** Calculate the monthly percent change in June

$$\left[ \frac{9,553.8}{9,539.5} - 1 \right] \times 100 = 0.15\%$$

2. **(3 points)** Calculate the monthly percent change in July

$$\left[ \frac{9,574.8}{9,553.8} - 1 \right] \times 100 = 0.22\%$$

3. **(3 points)** Calculate the percent change between December and May

$$\left[ \frac{9,539.5}{9,452.5} - 1 \right] \times 100 = 0.92\%$$

4. Calculate the annualized percentage change

- a. **(4 points)** In June

$$\left[ \left( \frac{9,553.8}{9,539.5} \right)^{12} - 1 \right] \times 100 = 1.81\%$$

- b. **(4 points)** In July

$$\left[ \left( \frac{9,574.8}{9,553.8} \right)^{12} - 1 \right] \times 100 = 2.67\%$$

- c. **(4 points)** From December to May

$$\left[ \left( \frac{9,539.5}{9,452.5} \right)^{\frac{12}{5}} - 1 \right] \times 100 = 2.22\%$$

5. **(4 points)** In which of the two months (June or July) employment growth was above the pace set in the first five months of the year? In which month it was below?

In annualized terms, employment growth in June (1.81%) was below the rate established in the first five months (2.22%), while the July figure (2.67%) was above it.

### Section III (30 points)

Consider the following two production possibility schedules:

(in millions)	Hockey Pucks	Soccer Balls
Canada	10	50
Brazil	5	30

1. **(2 points)** What is the opportunity cost of producing one million hockey pucks in Canada?

$$50/10 = 5 \text{ million soccer balls}$$

2. **(2 points)** What is the opportunity cost of producing one million soccer balls in Brazil?

$$5/30 = 0.17 \text{ million hockey pucks}$$

3. **(2 points)** What is the opportunity cost of producing one million soccer balls in Canada?

$$10/50 = 0.2 \text{ million hockey pucks}$$

4. **(2 points)** What is the opportunity cost of producing one million hockey pucks in Brazil?

$$30/5 = 6 \text{ million soccer balls}$$

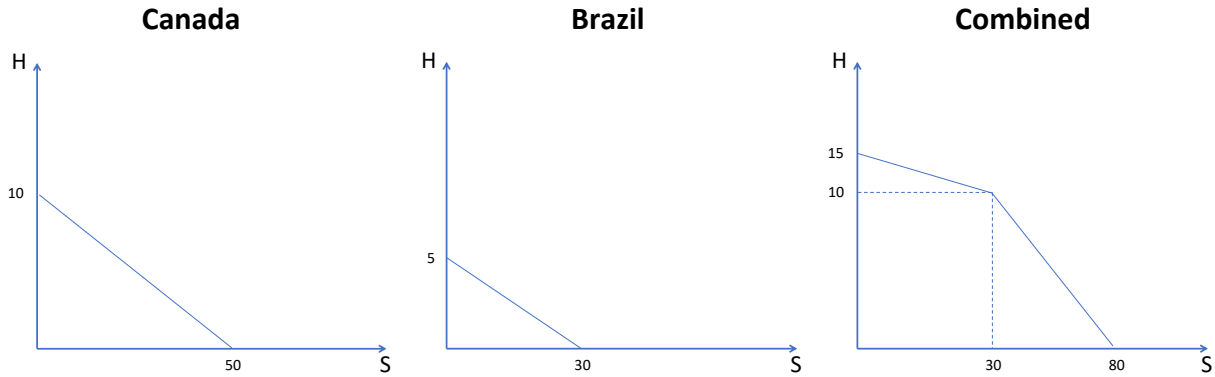
5. **(2 points)** Which country has the comparative advantage in the production of hockey pucks? Why?

Canada because its opportunity cost is lower ( $5 < 6$ )

6. **(2 points)** Which country has the absolute advantage in the production of soccer balls?

Canada because with same inputs can produce more ( $50 > 30$ )

7. **(6 points)** Draw the production possibilities frontiers for both countries, assuming a linear trade-off between hockey pucks and soccer balls. Then, draw the combined production possibilities frontier. In each case, specify the values at the corner and kink points.



8. **(2 points)** Suppose Brazil and Canada historically did not trade, due to a fight over whether hockey should be in the Olympics. If each country's tastes drive both to produce 20 million soccer balls, fill in the blanks below (as an economist, assume that both countries produce on the production possibilities frontier line).

#### Pre-Trade Consumption

(in millions)	Hockey Pucks	Soccer Balls
Canada	6	20
Brazil	1.67	20

9. **(8 points)** Now suppose Brazil relents and embraces hockey as a 'real sport'. Trade begins between Canada and Brazil. Brazil wants the same number of soccer balls for its citizens as before, but now produces 30 million soccer balls and sends the excess to Canada. In exchange, Canada sends 1.8 million hockey pucks to Brazil. Canada consumes the same number of hockey pucks as it did before trade. Fill in the table below.

#### Post-Trade Consumption

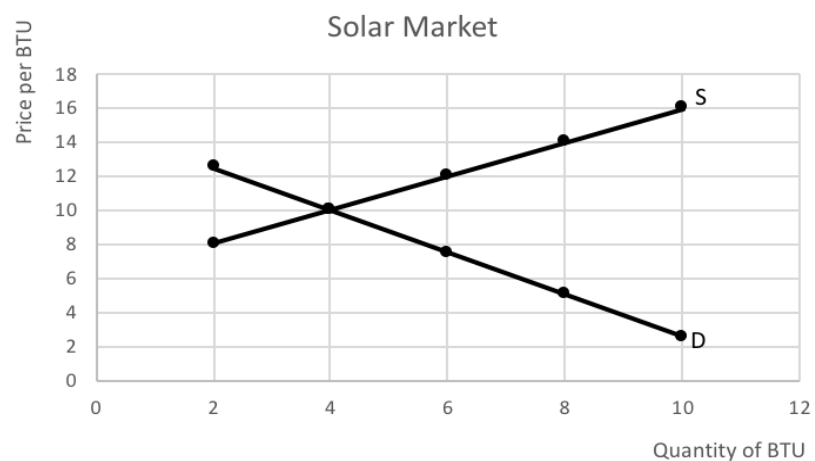
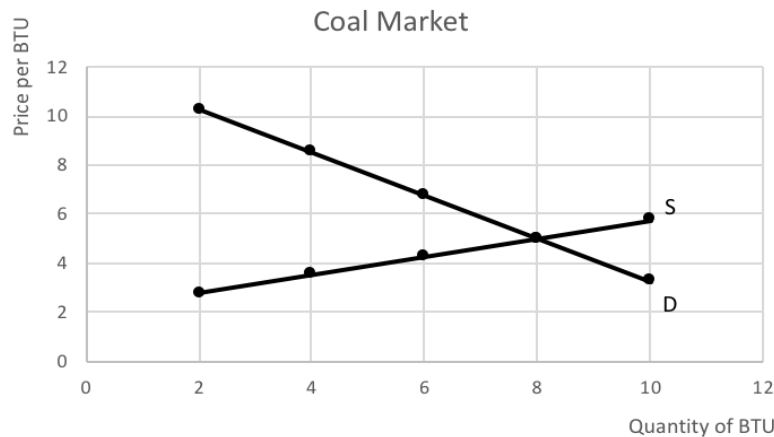
(in millions)	Hockey Pucks	Soccer Balls
Canada	6	10 + 11 = 21
Brazil	1.8	20

10. **(2 points)** Are both nations better off? Briefly explain.

Yes. After trade, each country receives an allocation that is outside its PPF relative to the case of no trade. In other words, both countries consume same or more of each product.

## Section IV (25 points)

**(10 points)** In 2015, the price of coal-generated electricity was \$5 per btu (a unit of energy), while the price of solar-energy generated electricity was \$10 per btu. The equilibrium quantities were 8 billion in the coal market and 4 billion in the solar energy market. Label the graphs below so that both markets are in equilibrium (i.e. label each axis and curve for each market).



- Suppose there is a technological breakthrough in 2019, and the cost of producing electricity using solar panel plunges. Suppose in 2020 the market achieves a new equilibrium. Suppose the new equilibrium price per btu, in the market for solar energy, moves to \$5.

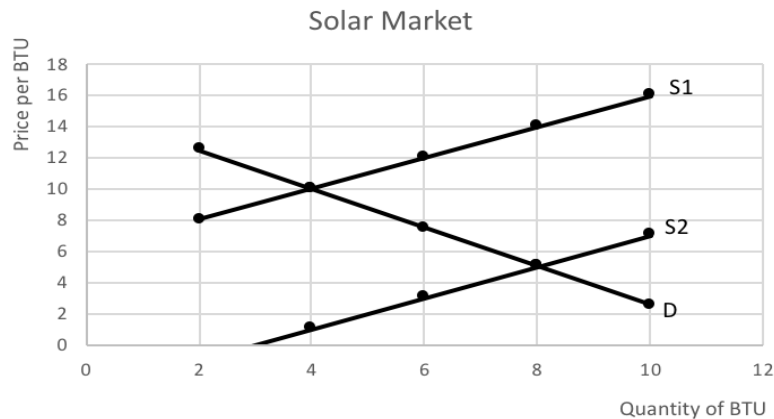
a. **(2 points)** Did the supply curve or demand curve shift for solar energy?

Supply curve

b. **(2 points)** Did we move along the supply or the demand curve for solar energy?

Demand curve

- c. **(3 points)** Draw the shift so that it correctly represents the new equilibrium.



- d. **(2 points)** What is the new equilibrium quantity of solar electricity purchased?

8 billion

- e. **(2 points)** Should we expect this to affect the market for coal? If so, is it because they are substitutes or compliments?

Yes. They are substitutes

- f. **(2 points)** Which curve shifts in the coal market's supply-demand space?

Decline in the demand for coal given technological breakthrough in the solar market

- g. **(2 points)** Suppose the total equilibrium quantity of electricity consumed is unchanged in 2020 relative to the equilibrium level in 2015. What must the new equilibrium quantity be for purchases of coal-generated electricity?

The new equilibrium quantity in the solar market is 8 billion

The new equilibrium quantity in the coal market is 4 billion (12 billion – 8 billion)

### Section V (20 points, 5 points each)

Consider the market for marmalades. In this market, the supply curve is given by  $Q_S = 10P_M - 5P_R$  and the demand curve is given by  $Q_d = 100 - 15P_M + 10P_B$ , where M denotes marmalades, R denotes oranges, and B denotes butter.

1. Assume that  $P_R$  is fixed at \$1 and  $P_B = 5$ . Calculate the equilibrium price and quantity in the marmalade market.

Equilibrium is attained when demand equals supply

$$\begin{aligned}Q_s &= Q_d \\10P_M - 5 &= 150 - 15P_M \\25P_M &= 155 \\P_M &= 6.2\end{aligned}$$

Substitute the value of  $P_M$  in one curve

$$\begin{aligned}Q_d &= 150 - 15 \times 6.2 \\Q_d &= 57\end{aligned}$$

2. Suppose that a poor harvest season raises the price of oranges to  $P_R = 2$ . Find the new equilibrium price and quantity of marmalade.

Equilibrium is attained when demand equals supply

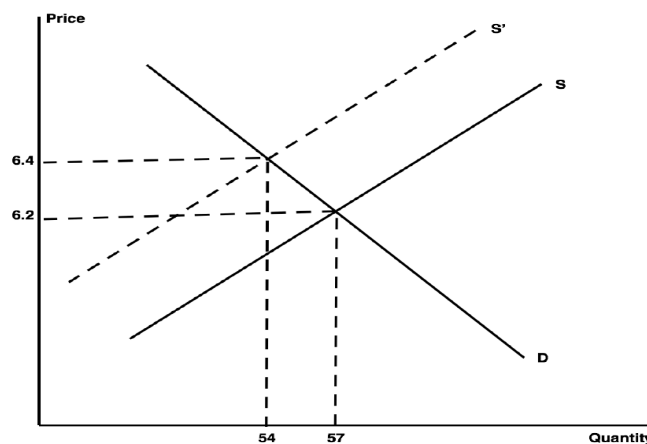
$$\begin{aligned}Q_s &= Q_d \\10P_M - 10 &= 150 - 15P_M \\25P_M &= 160 \\P_M &= 6.4\end{aligned}$$

Substitute the value of  $P_M$  in one curve

$$\begin{aligned}Q_d &= 150 - 15 \times 6.4 \\Q_d &= 54\end{aligned}$$

3. For part (b), identify the curve that would shift because of poor harvest. Illustrate in a graph below.

Poor harvest will cause the supply curve for marmalades to shift left



4. Suppose  $P_R = 1$  but the price of butter drops to  $P_B = 3$ . Find the new equilibrium price and quantity of marmalade.

$$\begin{aligned}Q_s &= Q_d \\10P_M - 5 &= 130 - 15P_M \\25P_M &= 135 \\P_M &= 5.4\end{aligned}$$

$$\begin{aligned}Q_d &= 130 - 15 \times 5.4 \\Q_d &= 49\end{aligned}$$