FACTOR MOBILITY

1-4 The United States and Mexico produce corn using labor and land and share the same technology. Initially, the U.S. wage is higher in than in Mexico. Consider the effects of allowing labor to move freely between the two countries, with no barriers to migration.

1. How must the ratio of labor to land in the United States compare to that in Mexico before migration occurs?
   a) higher in the United States
   b) lower in the United States
   c) the same as in Mexico
   d) higher in the United States or the same as in Mexico
   e) cannot tell from the information given

2. How will the ratio of labor to land in the United States compare to that in Mexico after migration occurs?
   a) higher in the United States
   b) lower in the United States
   c) the same as in Mexico
   d) higher in the United States or the same as in Mexico
   e) cannot tell from the information given

3. Who benefits in the United States?
   a) workers
   b) landowners
   c) workers and landowners
   d) neither workers nor landowners
   e) cannot tell from the information given

4. Who benefits in Mexico?
   a) all workers, regardless of whether they leave or stay
   b) only workers who stay
   c) only workers who leave
   d) landowners
   e) landowners, and workers who stay
FOREIGN DIRECT INVESTMENT

5-8 A German firm is deciding how to serve the U.S. market for lightbulbs.

5. Which of the following is an ownership advantage?
   a) concern that a licensee would skimp on quality
   b) lower labor costs in the United States than in Germany
   c) higher quality light bulbs that last longer than the competition
   d) superior process technology with lower costs than rivals
   e) c) or d)

6. Which of the following is a location advantage?
   a) concern that a licensee would skimp on quality
   b) lower labor costs in the United States than in Germany
   c) higher quality light bulbs that last longer than the competition
   d) superior process technology with lower costs than rivals
   e) b) or d)

7. Which of the following is an internalization advantage?
   a) concern that a licensee would skimp on quality
   b) lower labor costs in the United States than in Germany
   c) higher quality light bulbs that last longer than the competition
   d) superior process technology with lower costs than rivals
   e) a) or d)

8. If the firm chooses to establish a production subsidiary in the United States, which type of advantage must be missing?
   a) ownership
   b) location
   c) internalization
   d) location and internalization
   e) none of the above
TRADE POLICIES

9-12 The United States removes a binding quota on imports of sugar.

9. The quantity demanded of sugar in the United States
   a) rises for sure
   b) rises only if the United States is a large country
   c) remains the same
   d) falls for sure
   e) falls only if the United States is a large country

10. Consumer surplus in the United States
    a) rises for sure
    b) rises only if the United States is a large country
    c) remains the same
    d) falls for sure
    e) falls only if the United States is a large country

11. The quantity supplied of sugar in the United States
    a) rises for sure
    b) rises only if the United States is a large country
    c) remains the same
    d) falls for sure
    e) falls only if the United States is a large country

12. Producer surplus in the United States
    a) rises for sure
    b) rises only if the United States is a large country
    c) remains the same
    d) falls for sure
    e) falls only if the United States is a large country
13-16 Bhutan adopts a specific subsidy on agricultural exports.

13. The quantity demanded of agricultural products in Bhutan
   a) rises for sure
   b) rises only if Bhutan is a small country
   c) remains the same
   d) falls for sure
   e) falls only if Bhutan is a small country

14. Consumer surplus in Bhutan
   a) rises for sure
   b) rises only if Bhutan is a small country
   c) remains the same
   d) falls for sure
   e) falls only if Bhutan is a small country

15. The quantity supplied of agricultural products in Bhutan
   a) rises for sure
   b) rises only if Bhutan is a small country
   c) remains the same
   d) falls for sure
   e) falls only if Bhutan is a small country

16. Producer surplus in Bhutan
   a) rises for sure
   b) rises only if Bhutan is a small country
   c) remains the same
   d) falls for sure
   e) falls only if Bhutan is a small country
TRADE POLICY PROBLEMS

In the United States (US), inverse demand for tires is $P = 60 - 2Q_D$, while inverse supply is $P = 30 + 2Q_S$. In the rest of the world (ROW), inverse demand for tires is $P^* = 40 - 2Q_D^*$, while inverse supply is $P^* = 10 + 2Q_S^*$.

1. Derive the US autarky price and quantity.

Derive the US import demand (including slope-intercept form).

Derive the ROW autarky price and quantity.

Derive the ROW export supply (including slope-intercept form).
2. Derive the free trade price and US imports under free trade.

Derive US quantity demanded and quantity supplied under free trade.

3. Derive the US tariff-ridden import demand for a specific tariff $t = 10$ (including slope-intercept form).

Derive the ROW price, the US price, and US imports with the tariff.

Derive US quantity demanded and quantity supplied with the tariff.

How large of a tariff would the United States need to impose to prohibit all imports?
4. Derive the change in consumer surplus, producer surplus, and government revenue in the United States due to the tariff (starting with the general equations and being sure to indicate the areas corresponding to each on the US graph).

5. Define and derive the US consumption distortion and production distortion.

Define and derive the US efficiency loss and terms of trade gain.

6. Derive the change in welfare in the United States due to the tariff. Confirm that the net welfare calculation yields the same answer.

Is the United States better or worse off with the tariff and why?
DRAW WORLD MARKET GRAPH HERE: US IMPORT DEMAND, ROW EXPORT SUPPLY, US TARIFF-RIDDEN IMPORT DEMAND

DRAW US MARKET GRAPH HERE: US DEMAND, US SUPPLY
Indicate free trade price, US quantity demanded and quantity supplied under free trade, US tariff-ridden price, US quantity demanded and quantity supplied with the tariff, and ROW tariff-ridden price. Label areas corresponding to change in consumer surplus, change in producer surplus, change in government revenue, production distortion, consumption distortion, efficiency loss, and terms of trade gain.

On my honor as an Aggie, I have neither given nor received unauthorized aid on this exam.

Signature __________________________
1b The ratio of labor to land must be lower in the United States than in Mexico \textit{before} migration occurs.

2c It must be the same as in Mexico \textit{after} migration occurs.

3b Landowners benefit in the United States.

4a All workers, regardless of whether they leave or stay, benefit in Mexico.

5e Higher quality light bulbs that last longer than the competition, and superior process technology with lower costs than rivals are both examples of an ownership advantage.

6b Lower labor costs in the United States than in Germany is a location advantage.

7a Concern that a licensee would skimp on quality is an internalization advantage.

8e None of the above - need all three kinds of advantages.

9a The quantity demanded of sugar in the United States rises for sure.

10a Consumer surplus in the United States rises for sure.

11d The quantity supplied of sugar in the United States falls for sure.

12d Producer surplus in the United States falls for sure.

13d The quantity demanded of agricultural products in Bhutan falls for sure.

14d Consumer surplus in Bhutan falls for sure.

15a The quantity supplied of agricultural products in Bhutan rises for sure.

16a Producer surplus in Bhutan rises for sure.
PROBLEMS

1. Derive US autarky price and quantity.

\[ 60 - 2Q^A = 30 + 2Q^A, \quad 4Q^A = 30, \quad Q^A = 15/2 = 7.5 \]

\[ P^A = 60 - 2Q^A = 60 - 15 = 45 \]

Derive the US import demand (including slope-intercept form).

\[ P = 60 - 2Q_D, \quad Q_D = 30 - \frac{1}{2}P \]

\[ P = 30 + 2Q_S, \quad Q_S = -15 + \frac{1}{2}P \]

\[ M = Q_D - Q_S = 30 - \frac{1}{2}P - \left(-15 + \frac{1}{2}P \right) \]

\[ M = 45 - P, \quad P = 45 - Q_M \]

Derive the ROW autarky price and quantity.

\[ 40 - 2Q^{A*} = 10 + 2Q^{A*}, \quad 4Q^{A*} = 30, \quad Q^{A*} = 15/2 = 7.5 \]

\[ P^{A*} = 40 - 2Q^{A*} = 40 - 15 = 25 \]

Derive the ROW export supply (including slope-intercept form).

\[ P^* = 10 + 2Q^*_S, \quad Q^*_S = -5 + \frac{1}{2}P^* \]

\[ P^* = 40 - 2Q^*_D, \quad Q^*_D = 20 - \frac{1}{2}P^* \]

\[ X^* = Q^*_S - Q^*_D = -5 + \frac{1}{2}P^* - \left(20 - \frac{1}{2}P^* \right) \]

\[ X^* = -25 + P^*, \quad P^* = 25 + Q^*_X \]
2. Derive the free trade price and US imports under free trade.

\[ M = X^* \quad 45 - P = -25 + P^* \quad 70 = 2P \quad P = P^* = 35 \]

\[ M = 45 - P = 45 - 35 = 10 \]

Derive US quantity demanded and quantity supplied under free trade.

\[ P = 60 - 2Q_D \quad 35 = 60 - 2Q_D \quad D^1 = Q_D = \frac{25}{2} = 12.5 \]

\[ P = 30 + 2Q_S \quad 35 = 30 + 2Q_S \quad S^1 = Q_S = \frac{5}{2} = 2.5 \]

3. Derive the US tariff-ridden import demand for a specific tariff \( t = 10 \) (including slope-intercept form).

\[ M_T = 45 - P_T = 45 - (P_T^* + 10) \quad M_T = 35 - P_T^* \quad P_T^* = 35 - Q_{M_T} \]

Derive the ROW price, the US price, and US imports with the tariff.

\[ M_T = X^* \quad 35 - P_T^* = -25 + P_T^* \quad 60 = 2P_T^* \quad P_T^* = 30 \]

\[ P_T = P_T^* + t = 30 + 10 = 40 \]

\[ M_T = 35 - P_T^* = 35 - 30 = 5 \]

Derive US quantity demanded and quantity supplied with the tariff.

\[ P_T^* = 60 - 2Q_D^T \quad 40 = 60 - 2Q_D^T \quad D^2 = Q_D^T = 10 \]

\[ P_T^* = 30 + 2Q_S^T \quad 40 = 30 + 2Q_S^T \quad S^2 = Q_S^T = 5 \]

How large of a tariff would the United States need to impose to prohibit all imports?

\[ t' = P^A - P^{A*} = 45 - 25 = 20 \]
4. Derive the change in consumer surplus, producer surplus, and government revenue in the United States due to the tariff.

\[ \Delta CS = -abcd = -(P_T - P) \left( \frac{D^1 + D^2}{2} \right) = -(40 - 35) \left( \frac{12.5 + 10}{2} \right) = -56.25 \]

\[ \Delta PS = a = (P_T - P) \left( \frac{S^1 + S^2}{2} \right) = (40 - 35) \left( \frac{2.5 + 5}{2} \right) = 18.75 \]

\[ \Delta GR = ce = tM_T = 10 \times 5 = 50 \]

5. Define and derive the US consumption distortion and production distortion.

Consumption distortion is loss due to too little consumption (some units not consumed where value above free trade price).

\[ d = \Delta P \left( \frac{\Delta D}{2} \right) = (40 - 35) \left( \frac{12.5 - 10}{2} \right) = 8.25 \]

Production distortion is loss due to too much production (some units produced at cost above free trade price).

\[ b = \Delta P \left( \frac{\Delta S}{2} \right) = (40 - 35) \left( \frac{5 - 2.5}{2} \right) = 6.25 \]

Define and derive the US efficiency loss and terms of trade gain.

Efficiency loss is size of total distortion, consumption plus production.

\[ b + d = 6.25 + 6.25 = 12.5 \]

Terms of trade gain is degree that buy imports cheaper.

\[ e = (P - P^*)M_T = (35 - 30) \times 5 = 25 \]

6. Derive the change in welfare in the United States due to the tariff. Confirm that the net welfare calculation yields the same answer.

\[ \Delta W = \Delta CS + \Delta PS + \Delta GR = -56.25 + 18.75 + 25 = 12.5 \]

\[ e^{- (b+d)} = 25 - 12.5 = 12.5 \]

Is the United States is better or worse off due to the tariff and why?

Better. The terms of trade gain outweighs the efficiency loss for large country starting from free trade.

US MARKET GRAPH: US DEMAND, US SUPPLY