1. The Ricardian Model of Trade (50 points)
   a. Explain what the Ricardian Model predicts about the pattern of trade between two countries. In particular, what determines the type of good produced and exported by each country? (5 points)

   Comparative advantage in production determines what each country specialized in and exports.

   b. Consider two countries, Home and Foreign, that can produce two Goods: rugs and chairs. Home has 2,400 units of labor available. The unit labor requirement in chair production is 4 and the unit labor requirement in rug production is 8. Foreign has a labor force of 1,600 and can produce a single chair with 10 units of labor and a single rug with 4 units of labor. What is the opportunity cost of chairs in terms of rugs, i.e. $\frac{MPL_R}{MPL_C}$, in each country? In which country is the relative price of chairs lower? (5 points)

   For Home: $\frac{MPL_R}{MPL_C} = \frac{1}{8}/\frac{1}{4} = 1/2$  
   For Foreign: $\frac{MPL_R}{MPL_C} = \frac{1}{4}/\frac{1}{10} = 5/2$  

   The relative price of chairs is lower in the country with the lower opportunity cost for chairs, which is Home. (1 point)
c. Construct the world relative supply curve using the information given in part b. You do not need to explain each segment. Label the horizontal axis “Relative Quantity of Chairs” and label the vertical axis “Relative Price of Chairs: \( P_C/P_R \).” On the same graph, construct a world relative demand curve using the following coordinates: (Relative Quantity, Relative Price) = (0.5, 4), (1, 3.5), (1.5, 3), (2, 2.5), (2.5, 2), (3, 1.5). Make sure to label all relevant prices and quantities. (20 points)

Let’s start with the vertical axis. From part b, we know that Home will export Chairs (Home has comparative advantage) and that the relative price of Chairs in Home is 1/2 and in Foreign is 5/2.

Now for the horizontal axis. If Home uses all of its labor to produce chairs and Foreign uses all of its labor to produce rugs, then

\[
q_C = \text{labor} \times MPL_C, \quad q^*_C = 0 \\
q^*_R = \text{labor}^* \times MPL^*_R, \quad q_R = 0
\]

\[
= 2400 \times 1/4 \quad \quad \quad = 1600 \times 1/4
\]

\[
= 600 \quad \quad \quad = 400
\]

Thus, on the horizontal axis, the relative supply would be

\[
[q_C + q^*_C ]/[ q_R + q^*_R] = 600/400 = 3/2 = 1.5,
\]

which is the point at which these economies open to trade and the relative supply jumps to the higher relative price. The relative demand line is simple plotting.
d. For what price range would both Home and Foreign gain from engaging in trade? At the current world equilibrium, what is the equilibrium price of chairs? What will be the pattern of trade? Do both countries gain from trade at this price? Explain. (10 points)

Home and Foreign both gain from trade when the world price is greater than 1/2 and less than 5/2. (2 points)

At the current world equilibrium, the equilibrium relative price of chairs is 5/2. (2 points)

Home will only produce chairs. (2 points)
and Foreign will produce both chairs and rugs (2 points)

Home will want to export chairs, but Foreign is indifferent between exporting or not. Trade may or may not occur. If trade does occur, Home will export chairs while Foreign will export rugs. Home gains from trade, while Foreign is indifferent (i.e., does not gain from trade). (2 points)


e. Is the model an adequate predictor of international trade? Explain with some empirical evidence? What are some criticisms of the underlying assumptions of this model? (10 points)

The model’s adequacy as a predictor of international trade depends. It predicts that all countries gain from trade. There is only one factor of production, labor.

Based on the assumptions, it predicts extreme specialization, which is not usually the case.

Model assumptions do not take into account factor endowments.

There is no role for economies of scale.

The model predicts nothing about income distribution within countries.
2. The Hechscher-Ohlin Model of Trade (50 points)

a. Explain what the Hechscher-Ohlin Model predicts about the pattern of trade between two countries. In particular, what determines the type of good exported by each country? (5 points)

According to the Hechscher-Ohlin model, a country will export the good that intensively uses its abundant factor.

b. Home has roughly 500 units of labor (L) and 100 acres of land (T) for production. Home is able to produce a unit of cloth (labor intensive) with 6 workers and 1 acre of land. Home is able to produce a unit of food (land intensive) with 1 worker and 6 acres of land. Assume that firms are perfectly competitive such that:

\[ P_C = \frac{1}{1/MPL_C \cdot w} + \frac{1}{MPT_C \cdot r} \]
\[ P_F = \frac{1}{1/MPL_F \cdot w} + \frac{1}{MPT_F \cdot r} \]

If the wage rate at Home is 2 and the rental rate at home is 2, what is the relative price of cloth to food, \( P_C/P_F \)? If the wage rate should fall to 1, how will the relative price of cloth to food be affected? How will this change in the wage rate affect the land-labor ratios in each industry? Explain. (5 points)

When \( w = 2 \) and \( r = 2 \):
\[ P_C = \frac{1}{1/(1/6) \cdot 2} + \frac{1}{1 \cdot 2} = 14 \]
\[ P_F = \frac{1}{1 \cdot 2} + \frac{1}{1/(1/6) \cdot 2} = 14, \text{ so } P_C / P_F = 14/14 = 1 \] (0.5 points)

When \( w = 1 \) and \( r = 2 \):
\[ P_C = \frac{1}{1/(1/6) \cdot 1} + \frac{1}{1 \cdot 2} = 8 \]
\[ P_F = \frac{1}{1 \cdot 1} + \frac{1}{1/(1/6) \cdot 2} = 13, \text{ so } P_C / P_F = 8/13 \] (0.5 points)

The relative price of cloth falls when the wage-rental ratio falls.

Both \( P_C \) and \( P_F \) decrease when the wage falls, but \( P_C \) falls by more because cloth is a labor intensive good and is more affected by changes in \( w \). (2 points)

The land-labor ratios in each industry will decrease. As wages fall, labor becomes a relatively more attractive input. Firms in both industries will substitute away from land toward labor. (2 points)
Use the following information for parts c, d, e, f, and g.
Home has 8 workers and 6 acres of land. Foreign has 10 workers and 6 acres of land. Both countries possess the same technologies. To produce one unit of cloth, each country needs 2 workers and 1 acre of land. To produce a unit of food, each country needs 1 worker and 1 acre of land. Both countries also face identical consumer demand.

c. Which factor of production does each country possess in relative abundance? (5 points)

\[
\frac{L}{T} = \frac{8}{6} \quad \text{while} \quad \frac{L^*}{T^*} = \frac{10}{6}
\]

Foreign is abundant in labor, while Home is abundant in land.

d. Find the allocations of resources for each country. How much land and labor will be used in each industry in each country? (10 points)

In Home: \( \frac{L_C}{T_C} = \frac{2}{1} = 2 \), so \( L_C = 2 \ T_C \). \( \frac{L_F}{T_F} = \frac{1}{1} = 1 \), so \( L_F = T_F \).

(2 points)

For Home labor, \( L_C + L_F = 8 \). Substituting using \( L_C = 2 \ T_C \), and \( L_F = T_F \) we get \( 2 \ T_C + T_F = 8 \), and rearranging gives \( T_F = 8 - 2 \ T_C \). We also know that \( T_C + T_F = 6 \), so substituting gives \( T_C + 8 - 2 \ T_C = 6 \), and \( T_C = 2 \). Then, \( L_C = 2 \ T_C = 2(2) = 4 \).

Substituting \( T_C = 2 \) into \( T_F = 8 - 2 \ T_C \), gives \( T_F = 8 - 2 \ T_C = 8 - 2(2) = 4 \), and \( L_F = T_F = 4 \). (4 points)

In Foreign: \( L^*_C = 2 \ T^*_C \) and \( L^*_F = T^*_F \).

For Home labor, \( L^*_C + L^*_F = 10 \). Substituting using \( L^*_C = 2 \ T^*_C \), and \( L^*_F = T^*_F \) we get \( 2 \ T^*_C + T^*_F = 10 \), and rearranging gives \( T^*_F = 10 - 2 \ T^*_C \). We also know that \( T^*_C + T^*_F = 6 \), so substituting gives \( T^*_C + 10 - 2 \ T^*_C = 6 \), and \( T^*_C = 4 \). Then, \( L^*_C = 2 \ T^*_C = 2(4) = 8 \).

Substituting \( T^*_C = 4 \) into \( T^*_F = 10 - 2 \ T^*_C \), gives \( T^*_F = 10 - 2 \ T^*_C = 10 - 2(4) = 2 \), and \( L^*_F = T^*_F = 2 \). (4 points)
e. Production is given by the following functions:

\[
q_C = \min[L_C \cdot MPL_C, T_C \cdot MPT_C]
\]

\[
q_F = \min[L_F \cdot MPL_F, T_F \cdot MPT_F]
\]

Show which country has the larger relative supply of cloth, \(q_C/q_F\). (5 points)

For Home:
\[
q_C = \min[4 \cdot (1/2), 2 \cdot 1] = \min[2, 2] = 2
\]
\[
q_F = \min[4 \cdot 1, 4 \cdot 1] = \min[4, 4] = 4
\]
Then \(q_C/q_F = 2/4\).

For Foreign:
\[
q^*_C = \min[8 \cdot (1/2), 4 \cdot 1] = \min[4, 4] = 4
\]
\[
q^*_F = \min[2 \cdot 1, 2 \cdot 1] = \min[2, 2] = 2
\]
Then \(q^*_C/q^*_F = 4/2\).

Since, \(q_C/q_F = 2/4 < q^*_C/q^*_F = 4/2\), Foreign has a relatively larger supply of cloth.

f. Which country has the higher price of cloth to food in autarky? What happens to the relative price of cloth when the two countries open to trade? How does the relative price of cloth change in Home and in Foreign? (10 points)

Home has a relatively higher price of cloth to food in autarky. (2 points)

When trade occurs, the relative prices equalize somewhere between Home and Foreign’s autarky prices. (4 points)

Home’s price will fall while Foreign’s price will rise. (4 points)
g. How do Home’s workers and land owners fare from trade? Are they made better or worse off? What about Foreign’s workers and land owners? Explain why there are gains and losses from trade in each country? (10 points)

At Home, \( P_C/P_F \) falls implying that w/r falls by the Stolper-Samuelson effect. (2 points)

Firms in both industries will substitute labor for land. (2 points)

Because more labor is used in production, each worker’s marginal productivity falls. (2 points)

Since, in a competitive labor market, real wages = MPL, each worker earns less. Labor is made worse off while land owners are made better off because their marginal product has increased and their real rent has increased. (2 points)

At Foreign, \( P_C/P_F \) increases implying that w/r increases by the Stolper-Samuelson effect. The opposite result holds. Workers are made better off and land owners are made worse off. (2 points)