1. Let's examine a trade agreement between U.S and Mexico. We will examine a simple two good case, brooms and microchips.

Each country has 10 workers who can produce either microchips or brooms. A worker in U.S can produce 9 microchips a day or 1 broom a day. A worker in Mexico can produce 1 microchip or 9 brooms a day. This can be summarized in the following table:

<table>
<thead>
<tr>
<th>Output per worker</th>
<th>U.S.</th>
<th>Mexico</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microchips</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Brooms</td>
<td>1</td>
<td>9</td>
</tr>
</tbody>
</table>

a) Draw the production possibilities frontier (PPF) of microchips and brooms for U.S.
b) Draw the production possibilities frontier (PPF) of microchips and brooms for Mexico.

c) Explain how trade can benefit both the U.S and Mexico. Which country will import brooms and which country microchips?

The U.S. and Mexico can gain from trade with one another by taking advantage of the low cost of producing microchips in the U.S and the low cost of producing brooms in Mexico. The cost of producing one broom in U.S is 9 microchips. In Mexico the cost of producing a broom is only 1/9 microchips. If the U.S. produces microchips and imports brooms, and if Mexico produces brooms and imports microchips, both countries will gain from trade because they’ll each produce the good they can produce more cheaply and import the good that the other country produces more cheaply. Note that the U.S. has an absolute advantage in the production of microchips while Mexico has an absolute advantage in the production of brooms.
d) Suppose the terms of trade (i.e., prices) are such that one microchip is traded for one broom. Furthermore, suppose each country wants to consume the same amount of brooms and microchips. Find (i) how many microchips and brooms are produced in each country, (ii) the consumption of brooms and microchips in each country, and (iii) the trade between U.S and Mexico.

If one microchip is traded for one broom then U.S produces only microchips and it does not produce brooms at all. The reason is that in order to produce one broom the U.S has to give up 9 microchips while the costs of imported broom is only one microchip.

Thus the U.S produces 90 microchips and no brooms. In order to consume the same number of brooms as microchips, U.S imports 45 brooms in return for exporting 45 microchips. Consumption of microchips and brooms in U.S is 45.

Similarly Mexico produces only brooms. It produces 90 brooms and zero microchips. Mexico imports 45 microchips and exports 45 brooms so that consumption in Mexico is 45 brooms and 45 microchips.

e) If the profits of the brooms and microchips producers are higher the more they produce, who will oppose and who will support the agreement in the U.S?

The profits of the microchip producers in U.S will increase after allowing trade. Therefore they will support the trade agreement.

The profits of the broom producers in U.S will decrease and they will oppose the trade agreement.

2. Mr. Magus, who is very concerned about the agreement (he claims that not only will the owners of the broom factories lose, but also that many workers in the broom industry do not like to produce microchips), has invented a new way to produce brooms. Now a worker in the U.S. can produce 40 brooms a day:

<table>
<thead>
<tr>
<th></th>
<th>Output per worker</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>U.S.</td>
</tr>
<tr>
<td>Microchips</td>
<td>9</td>
</tr>
<tr>
<td>Brooms</td>
<td>40</td>
</tr>
</tbody>
</table>

Mr. Magnus claims that now, since U.S. has absolute advantage in microchips and brooms, trade has no benefits.

a) Explain how trade can benefit both U.S and Mexico, even under these conditions. Which
country will import brooms and which country microchips?

Now U.S has absolute advantage in both microchips and brooms, but Mexico still has comparative advantage in producing brooms. It remains cheaper (in terms of microchips) to produce brooms in Mexico than in the U.S. The cost of producing a broom in U.S. is 9/40 microchips, while the cost of producing a broom in Mexico is 1/9 microchips. Therefore, as in question #1, both countries can gain from trade if the U.S. produces microchips Mexico produces brooms. The U.S. will still import brooms and Mexico will still import microchips.

b) Suppose the terms of trade are such that one microchip is traded for five brooms, and both countries want to consume the same amount of brooms as microchips. Again find (i) how many microchips and brooms are produced in each country, (ii) the consumption of brooms and microchips in each country, and (iii) the trade between U.S and Mexico.

Since in U.S. the costs of importing a broom (1/5 microchips) is less than the costs of producing a broom (9/40), the U.S. produces microchips and imports brooms. The U.S. produces 90 microchips and in order to consume the same amount of brooms as microchips it imports 75 brooms in return for 15 microchips. Consumption in U.S is 75 microchips and 75 brooms.

Mexico produces only brooms because the cost of producing microchips in Mexico (9 brooms per microchip) is greater than the cost of importing microchips (5 brooms per microchip). Mexico produces 90 brooms. In order to consume the same number of microchips and brooms, Mexico imports 15 microchips in return for 75 brooms. Consumption in Mexico is 15 brooms and 15 microchips.

This can be shown mathematically. For the U.S. to consume the same number of microchips and brooms requires:

\[
\text{# of Microchips Consumed} = \text{# of Brooms Consumed}
\]

\[
90 - [\text{Microchip Exports}] = 5(\text{brooms/microchip}) \times [\text{Microchip Exports}]
\]

\[
90 = 6 \times [\text{Microchip Exports}]
\]

\[
15 = [\text{Microchip Exports}]
\]

\[
[\text{Microchips Consumed}] = 15 \times 5 = 75
\]

\[
[\text{Brooms Consumed}] = 15 \times 5 = 75
\]

A similar calculation can be performed to show that Mexico consumes 15 brooms and 15 microchips.

3. a) If a computer costs $1,000 and the exchange rate between the Japanese yen and the U.S dollar is 121 (121 yen = 1 dollar), what is the price of a computer in yen?

The price of a computer in yen is 1000 x 121 = 121,000 yen.

b) If a BMW costs 40,000 euros and the exchange rate between the euro and the dollar is 0.72
(0.72 euros = 1 dollar), what is the price of the BMW in dollars?

The price of a BMW in dollars is \( \frac{40,000}{0.72} = 55,556 \) dollars.

4. a) Explain what are a trade surplus and a trade deficit.

A trade surplus is when a country exports more than it imports. A trade deficit is when a country imports more than it exports.

b) Look up Table 34.1 of our textbook (pp. 664 in the 10th edition and p. 666 in the 9th edition). This table describes U.S goods and services balance of trade. In which years did the U.S have a trade surplus? In which years did it have a trade deficit?

The U.S. had a trade surplus before 1976 (except in 1945, of the years listed). The U.S. had a trade deficit from 1976 and onward.

c) Use your answer to (b) to explain how the U.S became the largest debtor nation in the world.

To finance the trade deficit from 1976 onwards, the U.S. had to borrow money from other countries. This is why the U.S. has become the largest debtor nation in the world. (This is not necessarily bad – the U.S. is also the richest nation in the world.)

5. Assume prices and interest rates are fixed. An economy is described by the following equations:

\[
\begin{align*}
C &= 100 + 0.6Y \\
I &= 50 \\
G &= 50 \\
E &= 20 \\
M &= 20 + 0.1Y
\end{align*}
\]

where \( E \) = exports and \( M \) = imports.

a) Find the equilibrium output, consumption, imports, and the trade deficit.

Equilibrium occurs where \( AE = Y \), therefore:

\[
\begin{align*}
C + I + G + E - M &= Y \\
(100 + 0.6Y) + 50 + 50 + 20 - (20 + 0.1Y) &= Y \\
\Rightarrow 100 + 50 + 50 + 20 - 20 &= Y - 0.6Y + 0.1Y \\
\Rightarrow 200 &= 0.5Y \\
\Rightarrow Y &= 400
\end{align*}
\]

So equilibrium output is 400. Using the original equations we can then find: \( C = 340, M = 60 \), and the trade deficit \( (M - E) = 40 \).
b) What is the G multiplier?

\[
\frac{1}{1 - (MPC - MPM)} = \frac{1}{1 - (0.6 - 0.1)} = \frac{1}{0.5} = 2
\]

c) If government spending is increased by 10 to 60, what is the new equilibrium output? What are the new levels of consumption, imports, and the trade deficit?

Since the G multiplier is 2, raising G by 10 raises equilibrium output by 20 to 420. Then:

\[
\begin{align*}
C &= 100 + 0.6(420) = 325 \\
M &= 20 + 0.1(420) = 62 \\
M - E &= 62 - 20 = 42
\end{align*}
\]

d) Is the multiplier in an open economy (economy with imports and exports) greater or smaller than the multiplier in a closed economy (economy without imports or exports)? Explain why.

The multiplier in an open economy is smaller than the multiplier in a closed economy. This occurs because some of the increase in aggregate expenditure is on foreign products (imports) rather than on domestically produced goods and services.