Question 1.1

A. Which three conceptual steps have to be taken before we are able to give an estimate of the total value of goods and services produced in a country which is also reasonably comparable between countries?

B. What is the difference between domestic product and national product?

C. What is a 'purchasing power parity' (PPP) exchange rate?

D. Explain why the domestic product is higher for most developing countries if we use PPP exchange rates rather than nominal exchange rates to convert the estimates from national currencies to 'dollars'.

Question 1.4*\(^1\)
Figure 1.5 of the book shows the relative exports of good and services for a selection of countries. The "question 1-4" Excel file on the website contains statistical information on exports and income for many other countries. Use this information to answer the following questions.
A. Which countries have large export intensities (= exports/GDP)?
B. Is the size of a country related to its export intensity?

Question 1.5
In question 1.2 we discuss the PPP exchange rate, which is based on the 'law of one price'. Using this 'law' the weekly magazine *The Economist* calculates the so-called Big-Mac index, which reflects the exchange rate between currencies if the law of one price is applied to the price of McDonald's Big Mac in different countries.

The "question 1-5" Excel file on the website lists the price of a Big Mac in different countries. Calculate the exchange rate between countries based on the law of one price for a Big Mac. Compare your results to the actual exchange rates. Which currencies are most overvalued and which most undervalued?

Chapter 2 Opportunity costs

Question 2.1
In section 2.4 productivity tables are presented based on empirical data. We will do the same in this question. Labour productivity in a sector is calculated by dividing total value added by the number of employees.
A. What criticism can you offer on this approach to measure labour productivity?
   (Think of the different factors of production).

Below you find a copy of Table 2.2, which indicates the productivity of workers in the food and transport equipment industries of Japan and the USA.

\(^1\) Indicative answers to questions identified with an asterisk are given on the website of the book.
**Value added per employed person per year (US $, 1990)**

<table>
<thead>
<tr>
<th></th>
<th>Food (311/2)</th>
<th>Transport equipment (384)</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>82,337</td>
<td>77,582</td>
</tr>
<tr>
<td>Japan</td>
<td>48,273</td>
<td>81,928</td>
</tr>
</tbody>
</table>

Source: Van Marrewijk, 2001 (ISIC category in parenthesis)

Assume for now that in both countries only food is produced.

B. Given this information, can the USA and Japan both benefit from international trade? Explain.

Take both the food processing and transport equipment industries into account.

C. In this new situation, can trade between the USA and Japan be profitable for both countries? Why is this the case?

**Question 2.3**

In a market with perfect competition and firms facing equal cost functions that are characterised by constant returns to scale, the price of a good (p) will be equal to the unit cost of production (c), see Box 2.1. Show this result mathematically using the firm's profit function given below (where "x" is the quantity produced) if the firm's objective function is to maximise its profits.

\[ \pi = px - cx = (p - c)x \]

**Chapter 3 Comparative advantage**

**Question 3.2**

The table below gives the amount of labour needed to produce one ship, one bicycle and one aeroplane in Europe and Kenya within the Ricardian model.

<table>
<thead>
<tr>
<th></th>
<th>Ship</th>
<th>Bicycle</th>
<th>Aeroplane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kenya</td>
<td>200</td>
<td>50</td>
<td>500</td>
</tr>
<tr>
<td>Europe</td>
<td>100</td>
<td>30</td>
<td>200</td>
</tr>
</tbody>
</table>

A. Which country has an absolute advantage in the production of ships, bicycles and planes?

B. What is Europe's comparative advantage if we only look at ships and bicycles?
C. What is Europe's comparative advantage if we only look at bicycles and aeroplanes?

D. Can you infer from your calculations in 3.2B and 3.2C which product Europe will export for sure and which product it surely will not export? Why?

E. Which product will Kenya produce for sure and which one not? Why?

Question 3.4
Assume that there are two countries, Europe and Kenya, producing 2 goods, cars and textiles. There are 200 labourers available in Europe and 120 labourers in Kenya. The figure below gives the production possibility frontiers for both Europe and Kenya.

A. What is the state of technology in both countries (the number of units of labour needed to produce textiles and cars both in Europe and Kenya)?

Assume that the consumers in both countries want to consume at least some units of both goods.
B. What is the equilibrium price of a car (expressed in units of textiles) in a situation of autarky in Europe? What will this price be in Kenya?

C. Which products will Kenya and Europe export according to the theory of comparative advantage?

D. Which price range (expressed as the price of a car in units of textiles) will make trade between Europe and Kenya possible?

E. Which price range (expressed as the price of a car in units of textiles) makes specialisation of production in both countries possible?

**Question 3.11**

In section 3.6 the theory of comparative advantage was empirically analysed for Europe and Kenya. First by calculating the Kenyan “export(%) - import(%)” indicator:

\[
\text{export(%) - import(%) = } \frac{\text{Export industry } i}{\text{Total exports}} - \frac{\text{Import industry } i}{\text{Total imports}}
\]

Second, by calculating the relative productivity ratio:

\[
\text{Relative productivity ratio} = \frac{\left( \frac{\text{productivity Kenya industry } i}{\text{productivity Europe industry } i} \right)}{\left( \frac{\text{productivity Kenya manufacturing sector}}{\text{productivity Europe manufacturing sector}} \right)}
\]

Industry i was classified to trade according to comparative advantage if the first indicator was positive and the second indicator above one, or if the first indicator was negative and the second indicator below one.

The "question 3-11" Excel file on the website contains data for exports, imports, and productivity for Japan and the Philippines, rather than Kenya and Europe. If you repeat the analysis of section 3.6 for these two countries, which sectors behave in accordance with comparative advantage? How well does comparative advantage explain the international trade flows between Japan and the Philippines? Explain.

**Question 3.12**

The "question 3-12" Excel file on the website allows you to experiment with the situation described in Figure 3.3 of the book, which shows the production possibility frontier and budget lines of the EU and Kenya for food and chemicals. The simulation allows you to modify the figure by changing the labour endowments, the labour
requirements, or the terms of trade. We assume that Kenya and the EU are the only two countries in the world, and that consumers in both countries want to consume both goods.

The simulation has the starting values: $a_F^{EU} = 2$, $a_C^{EU} = 8$, $a_F^K = 4$, $a_C^K = 24$, labour endowment EU = 200, labour endowment Kenya = 120 and terms of trade = 0. Note that some of the values have to be changed before you can answer the questions below.

A. How many units of food and how many units of chemicals do Kenya and the EU produce if the terms of trade is one unit of food per unit of chemicals? What if the terms of trade is two units of food per unit of chemicals? Continue to answer this question until you have reached a terms of trade of ten units of food per unit of chemicals. Fill in your answers in the table below.

<table>
<thead>
<tr>
<th>Terms of trade</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food production</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemical production</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

B. Determine the range within which the terms of trade may vary in order for an equilibrium situation to arise. Explain.

C. Does this range change if you change the labour endowments?

D. Does this range change if you change the labour requirements?

**Part II Neo-classical trade**

**Chapter 4 Production structure**

*Question 4.6*

In the "question 4-6" Excel file on the website you can find the capital stock, labour force, and GDP per worker for a large number of countries.

A. Is there a relationship between GDP per worker and the capital stock per worker? Make a graph to illustrate your findings.

B. Can you explain this relationship?

C. Do you see this relationship reflected in tables such as table 3.3?

A. What seems to be a crucial component for the level of economic development?


**Chapter 5 Factor prices**

**Question 5.3**

The Russians and the Germans both like Vodka and Beer. Suppose that these are the only two products they consume and produce. Moreover, suppose that as a result of regulations Vodka and Beer cannot be traded between Russia and Germany initially.

Beer is produced with the help of machines largely controlled by computers. Beer breweries are therefore capital intensive. The production process of Vodka, on the other hand, is more traditional and therefore quite labour intensive.

Because of its large population and lack of capital goods, the wage-rental ratio \((w/r)\) is initially lower in Russia than in Germany.

A. In the initial situation, in which the two countries cannot trade, will the price ratio of Vodka against Beer \((P_{	ext{Vodka}}/P_{	ext{Beer}})\) be higher in Russia or in Germany?

Suppose that, after intensive international consultations, the regulations for Vodka and Beer are lifted. These goods can now be freely and costlessly exported and imported. In response, Russia starts to produce more Vodka and less Beer while Germany starts to produce more Beer and less Vodka. Russia exports Vodka in exchange for Beer.

B. Once the two countries can trade, will the price ratio of Vodka against Beer \((P_{	ext{Vodka}}/P_{	ext{Beer}})\) be higher in Russia or in Germany?

C. What will happen to the wage-rental ratio in Russia? Why?

D. What will happen to the wage-rental ratio in Holland? Why?

**Question 5.4**

We ask you to clarify the situation of question 5.3 graphically. The figure below depicts the unit value isoquant for Beer, assumed to be equal for Russia and Germany (numéraire). You must add unit value cost lines and unit value isoquants.
A. Draw the unit value cost lines and unit value isoquants for Vodka for both Russia and Germany in a situation of autarky in the figure above.

B. What will happen to the price of Beer in Russia and Germany if both countries start to trade?

C. What will happen to the price of Vodka in Russia and Germany if both countries start to trade?

D. Draw the new unit value isoquants and unit value cost lines in the figure above in a situation in which Russia and Germany engage in international trade.

E. What happens to the wage rates and rental rates in both countries?

The trade liberalisations in Russia and Germany have not remained unchallenged.

E. Which groups of people are likely to protest against the liberalisations? Why?

F. What can the politicians in Russia and Germany do in response to these protests?

*Question 5.12*

We will again analyse the Lerner diagram. Instead of deriving final goods prices from factor prices, the simulation in the "question 5-12" Excel file on the website derives
factor prices from final goods prices, as in the Stolper-Samuelson proposition.

Initially, we assume $\alpha_m = 0.8$, $\alpha_f = 0.2$, $p_m = 0.3$, and $p_f = 0.3$.

A. Increase the price of manufactures in the simulation. What happens to the wage rate and rental rate? What happens to the factor inputs? Explain.

B. Fill in the table below by changing the price of manufactures while keeping the price of food stable at 0.3. Comment on the development of the *factor prices*.

<table>
<thead>
<tr>
<th>Price of manufactures</th>
<th>0.1</th>
<th>0.2</th>
<th>0.3</th>
<th>0.4</th>
<th>0.5</th>
<th>0.6</th>
<th>0.7</th>
<th>0.8</th>
<th>0.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wage rate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rental rate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

C. Also, fill in the table below by changing the price of manufactures while keeping the price of food stable at 0.3. Comment on the development of the *factor inputs*.

<table>
<thead>
<tr>
<th>Price of manufactures</th>
<th>0.1</th>
<th>0.2</th>
<th>0.3</th>
<th>0.4</th>
<th>0.5</th>
<th>0.6</th>
<th>0.7</th>
<th>0.8</th>
<th>0.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour input manufactures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital input manufactures</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Chapter 6 Production Volume

Question 6.2

The two graphs below depict Bangladesh, which produces capital-intensive rice and labour-intensive clothing. The top graph shows the unit value isoquants for both goods. The bottom graph is an Edgeworth Box.
A. Draw the optimal production point in the Edgeworth box.

B. What happens if the price of clothing increases? Draw the new situation in both graphs.

C. The Rybczynski result is based on the assumption that the prices of final goods remain constant. Explain why a price rise for clothing combined with an increase in the labour stock will not necessarily lead to an increase in the production of rice.