Question 1: Calculating RGDP and NGDP.

<table>
<thead>
<tr>
<th>Good</th>
<th>Quantity</th>
<th>Price</th>
<th>Quantity</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cars</td>
<td>300</td>
<td>$50</td>
<td>360</td>
<td>$60</td>
</tr>
<tr>
<td>Tires</td>
<td>1,200</td>
<td>$2</td>
<td>1,440</td>
<td>$4</td>
</tr>
<tr>
<td>Bread</td>
<td>1,000</td>
<td>$10</td>
<td>800</td>
<td>$20</td>
</tr>
</tbody>
</table>

a. If base year is 2012, calculate $NGDP$, $RGDP$, and the $GDP\text{deflator}$ for 2012 and 2013.

- $NGDP_{2012} = 300 \times 50 + 1,000 \times 10 = 25,000$
- $NGDP_{2013} = 360 \times 60 + 800 \times 20 = 37,600$
- $RGDP_{2012} = 300 \times 50 + 1,000 \times 10 = 25,000$
- $RGDP_{2013} = 360 \times 50 + 800 \times 10 = 26,000$
- $GDP \text{ deflator}_{2012} = \frac{25,000}{25,000} = 1$
- $GDP \text{ deflator}_{2013} = \frac{37,600}{26,000} = 1.45$

b. What is the NGDP and RGDP growth? Why are they different?

- $NGDP \text{ growth} = \frac{NGDP_{2013} - NGDP_{2012}}{NGDP_{2012}} \times 100 = \frac{37,600 - 25,000}{25,000} \times 100 = 50.4\%$
- $RGDP \text{ growth} = \frac{RGDP_{2013} - RGDP_{2012}}{RGDP_{2012}} \times 100 = \frac{26,000 - 25,000}{25,000} \times 100 = 4\%$

- They are different because $NGDP$ growth is a result of changes in quantities and prices. $RGDP$ growth, on the other hand, is a result of changes in quantities.
**Question 2:** Suppose the production function in medieval Santa Cruz is $Y = K^{0.75}L^{0.25}$, where K is the amount of capital and L is the amount of labor. The economy begins with 100 units of capital and 100 units of labor. Find a numerical answer to each of the following questions:

a. How much output does the economy produce?
   - To find amount produced, substitute the given values for labor and capital into the production function.
   - $Y = 100^{0.75}100^{0.25} = 100$

b. What are the real wage and the real rental price of land?
   - In this problem $\alpha = .75$ and $A = 1$.
   - $\frac{W}{P} = MPL = (1 - \alpha)K^\alpha L^{-\alpha} = .25(100)^{0.75}(100)^{-0.75} = .25$
   - $\frac{R}{P} = MPK = \alpha K^{\alpha - 1} L^{1 - \alpha} = .75(100)^{-0.25}(100)^{0.25} = .75$

c. What share of output does labor receive?
   - What labor receives is given by the marginal product of labor times the quantity of labor, or $\frac{W}{P}L = MPL \cdot L = .25 \cdot 100 = 25$.
   - The share of output is 25/100 = .25 or 25% of output.

d. If a plague kills half the population, what is the new level of output?
   - $Y = 100^{0.75}50^{0.25} = 84.1$

e. What happens to the new real wage and real rental price of land? Did they increase or decrease?
   - $\frac{W}{P} = MPL = (1 - \alpha)K^\alpha L^{-\alpha} = .25(50)^{0.75}(50)^{-0.75} = .42$
   - The new real wage goes up.
   - $\frac{R}{P} = MPK = \alpha K^{\alpha - 1} L^{1 - \alpha} = .75(100)^{-0.25}(50)^{0.25} = .63$
   - The rental price goes down.

f. What share of output does labor receive now?
   - What labor receives is given by the marginal product of labor times the quantity of labor, or $\frac{W}{P}L = MPL \cdot L = .42 \cdot 50 = 21$.
   - The share of output is 21/84.1 = .25 or 25% of output. Note this is the same share as above!
Question 3: Consider an economy described by the following equations:

\[ Y = C + I + G \]

\[ Y = 5,000 \]
\[ G = 1,000 \]
\[ T = 1,000 \]
\[ C = 250 + 0.75(Y - T) \]
\[ I = 1,000 - 50r \]

a. In this economy, compute private savings, public savings, and national savings.

- \( S_{\text{private}} = Y - T - C = 5,000 - 1,000 - (250 + 0.75(5,000 - 1,000)) = 750 \)
- \( S_{\text{public}} = T - G = 1,000 - 1,000 = 0 \)
- Total savings = \( S = S_{\text{private}} + S_{\text{public}} = 750 + 0 = 750 \)

b. Find the equilibrium interest rate.

- Since \( S = I \), then \( 750 = 1,000 - 50r \).
- Solving for \( r \), we get that \( r = 5 \)

c. Now suppose that \( G \) rises to 1,250. Compute private savings, public savings, and national savings.

- \( S_{\text{private}} = Y - T - C = 5,000 - 1,000 - (250 + 0.75(5,000 - 1,000)) = 750 \)
- \( S_{\text{public}} = T - G = 1,000 - 1,250 = -250 \)
- Total savings = \( S = S_{\text{private}} + S_{\text{public}} = 750 - 250 = 500 \)

d. Find the new equilibrium interest rate.

- \( S = 500 = I = 1,000 - 50r \)
- Solving for \( r \), we get that \( r = 10 \)
- So, an increase in \( G \), increases the real interest rate.
Question 4: Consider an economy described by the following equations:

\[ Y = C + I + G + NX \]

\[ Y = 5,000 \]
\[ G = 1,000 \]
\[ T = 1,000 \]
\[ C = 250 + 0.75(Y - T) \]
\[ I = 1,000 - 50r \]
\[ NX = 500 - 500\epsilon \]
\[ r = r^* = 5 \]

a. In this economy, solve for national saving, investment, the trade balance, and the equilibrium exchange rate.

- Total savings = \( S = S^{private} + S^{public} = Y - T - C + T - G = Y - C - G \)
- Total savings = \( 5,000 - (250 + 0.75(5,000 - 1,000)) - 1,000 = 750 \)
- Investment \( I = 1,000 - 50r^* = 1,000 - 50 \times 5 = 750 \)
- The trade balance: \( NX = S - I = 750 - 750 = 0 \)
- The equilibrium exchange rate: \( NX = 500 - 500\epsilon = 0, \text{ so } \epsilon = 1 \)

b. Suppose now that \( G \) rises to 1250. Solve for national saving, investment, the trade balance, and the equilibrium exchange rate. Explain what you find.

- Total savings = \( S = S^{private} + S^{public} = Y - T - C + T - G = Y - C - G \)
- Total savings = \( 5,000 - (250 + 0.75(5,000 - 1,000)) - 1,250 = 500 \)
- Investment \( I = 1,000 - 50r^* = 1,000 - 50 \times 5 = 750 \)
- The trade balance: \( NX = S - I = 750 - 750 = 0 \)
- The equilibrium exchange rate: \( NX = 500 - 500\epsilon = -250, \text{ so } \epsilon = 1.5 \)
- The increase in government spending reduces national saving, but with an unchanged world real interest rate, investment remains the same. Therefore, domestic investment now exceeds domestic saving, so some of this investment must be financed by borrowing from abroad. This capital inflow is accomplished by reducing net exports, which requires that the currency depreciate.

c. Now suppose that the world interest rate rises from 5 to 10 percent, (\( G \) is again 1000). Solve for national saving, investment, the trade balance, and the equilibrium exchange rate. Explain what you find.

- Total savings = \( S = S^{private} + S^{public} = Y - T - C + T - G = Y - C - G \)
- Total savings = \( 5,000 - (250 + 0.75(5,000 - 1,000)) - 1,000 = 750 \)
- Investment \( I = 1,000 - 50r^* = 1,000 - 50 \times 10 = 500 \)
- The trade balance: \( NX = S - I = 750 - 500 = 250 \)
- The equilibrium exchange rate: \( NX = 500 - 500\epsilon = 250, \text{ so } \epsilon = 1.5 \)
- Saving is unchanged from part (a), but the higher world interest rate lowers investment. This capital outflow is accomplished by running a trade surplus, which requires that the currency depreciate.
Question 5: The country of Slugdia is a small open economy. Suddenly, a change in world fashions makes Slugdia’s exports of tie dye products popular.

a. What happens in Slugdia to saving, investment, net exports, the interest rate and the exchange rate?

– When Slugdia’s exports become more popular, its domestic saving \( Y - C - G \) does not change. This is because we assume that \( Y \) is determined by the amount of capital and labor, consumption depends only on disposable income, and government spending is a fixed exogenous variable. Investment also does not change, since investment depends on the interest rate, and Slugdia is a small open economy that takes the world interest rate as given. Because neither saving nor investment changes, net exports, which equal \( S - I \), do not change either. This is effect is similar to that shown in Figure 6-12 in the book; the \( S - I \) curve does not move. The increased popularity of Slugdia’s exports leads to a shift outward of the net exports curve, as shown in the Figure. At the new equilibrium, net exports are unchanged but the currency has appreciated.

– Even though Slugdia’s exports are more popular, its trade balance has remained the same. The reason for this is that the appreciated currency provides a puts downward pressure on net exports, which overcomes the popularity of its exports by making them more expensive.

b. The citizens of Slugdia like to travel abroad. How will this change in the exchange rate affect them?

– Slugdia’s currency now buys more foreign currency, so traveling abroad is less expensive. This is an example of the fact that imports (including foreign travel) have become less expensive as required to keep net exports unchanged in the face of increased demand for exports.

c. The fiscal policymakers of Slugdia want to adjust taxes to maintain the exchange rate at its previous level. What should they do? If they do this, what are the overall effects on saving, investment, net exports and the interest rate?

– If the government increases taxes, then disposable income and consumption decrease. Hence, saving increases so that net exports also increase. In figure, the \( S - I \) curve shifts to the right, increasing net exports until the exchange rate is again equal to its initial value. This increase in net exports puts downward pressure on the exchange rate that offsets the increased world demand. Investment and the interest rate would be unaffected by this policy since Slugdia takes the world interest rate as given.