Question 1 on page 234 (10 points)

**Answer:**

Equilibrium GDP is 1,720 (see diagram). The marginal propensity to consume is 0.75 and the multiplier is 4. If government purchases fall by 60, and the price level is unchanged, GDP would fall by $4 \times 60 = 240$, that is, to 1,480.

Question 2 on page 234 (10 points)

**Answer:**

<table>
<thead>
<tr>
<th>GDP</th>
<th>Taxes</th>
<th>Disposable Income</th>
<th>Consumption</th>
<th>Total Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1360</td>
<td>320</td>
<td>1040</td>
<td>810</td>
<td>1540</td>
</tr>
<tr>
<td>1480</td>
<td>360</td>
<td>1120</td>
<td>870</td>
<td>1600</td>
</tr>
<tr>
<td>1600</td>
<td>400</td>
<td>1200</td>
<td>930</td>
<td>1660</td>
</tr>
<tr>
<td>1720</td>
<td>440</td>
<td>1280</td>
<td>990</td>
<td>1720</td>
</tr>
<tr>
<td>1840</td>
<td>480</td>
<td>1360</td>
<td>1050</td>
<td>1780</td>
</tr>
</tbody>
</table>

Compared to Question 1, the expenditure line has a flatter slope, but it still crosses the 45-degree line at a GDP of 1720. The marginal propensity to consume is still 0.75. Now, however, the marginal tax rate is 1/3 (that is, when income rises by 3, taxes rise by 1). Consequently the multiplier falls to 2. A reduction in G of 60 will lower equilibrium GDP by 120 (provided prices do not change), to a new level of...
1600. Comparison of the two questions shows that the introduction of a variable tax lowers the multiplier.

**Question 3 on page 234 (10 points)**

**Answer:** At each level of GDP, G rises by 120, while C falls by three quarters of 120, or 90. Therefore there is a net increase in expenditures of 30, as follows:

<table>
<thead>
<tr>
<th>GDP</th>
<th>Taxes</th>
<th>Disposable Income</th>
<th>Consumption</th>
<th>Total Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1360</td>
<td>520</td>
<td>840</td>
<td>630</td>
<td>1480</td>
</tr>
<tr>
<td>1480</td>
<td>520</td>
<td>960</td>
<td>720</td>
<td>1570</td>
</tr>
<tr>
<td>1600</td>
<td>520</td>
<td>1080</td>
<td>810</td>
<td>1660</td>
</tr>
<tr>
<td>1720</td>
<td>520</td>
<td>1200</td>
<td>900</td>
<td>1750</td>
</tr>
<tr>
<td>1840</td>
<td>520</td>
<td>1320</td>
<td>990</td>
<td>1840</td>
</tr>
</tbody>
</table>

Equilibrium GDP is now 1,840, which is 120 more than in Test Yourself Question 1.

**Question 4 on page 234 (10 points)**

**Answer:** Since you want to reduce GDP by 120, and since the multiplier is 4, you must take some action that will have an initial impact of reducing expenditure on GDP by 30. You may cut government spending by 30. Instead, you may raise taxes or reduce transfer payments by 40. Either of these latter two policies will lower disposable income by 40 and, since the marginal propensity to consume is 0.75, lower consumption by 30.

**Question 1 on page 240 (10 points)**

**Answer:**

\[ Y = C + I + G + (X - IM) \]

\[ C = 120 + 0.8DI \]

\[ DI = Y - T \]

\[ DI = Y - (200 + 0.25Y) \]

\[ DI = 0.75Y - 200 \]

\[ C = 120 + 0.8(0.75Y - 200) \]

\[ C = 120 + 0.6Y - 160 \]

\[ C = 0.6Y - 40 \]

\[ Y = 0.6Y - 40 + 320 + 480 - 80 \]

\[ Y = 0.6Y + 680 \]

\[ 0.4Y = 680 \]

\[ Y = (1/0.4) \times 680 \]

\[ Y = 2.5 \times 680 = 1,700 \]

Equilibrium GDP is 1,700.

There are three different ways to find the multipliers, any one of which is correct. For government purchases:

i. Note from the preceding equations that equilibrium GDP is 2.5 times all autonomous spending. Since G is autonomous spending, the multiplier for G is 2.5.
ii. Raise G from 480 to 481. Working through the algebra above, this comes to 
0.4Y = 681, which implies that Y = 1,702.5. So the increase in G of 1 has 
raised Y by 2.5, and the multiplier is 2.5.

iii. From the formula in the appendix, the multiplier is 
\[ \frac{1}{1 - b(1 - t)} = \frac{1}{1 - 0.8(1 - 0.25)} \]
\[ = \frac{1}{1 - 0.8(0.75)} = \frac{1}{1 - 0.6} \]
\[ = \frac{1}{0.4} = 2.5 \]

For fixed taxes:
i. Note that a rise in fixed taxes decreases GDP (so the sign of the multiplier is 
negative) and that it increases spending in the first round by the marginal 
propensity to consume times the tax reduction. So the tax multiplier is the 
multiplier found above, multiplied by (minus) the MPC, or 2.5 \times (-0.8) = -2

ii. Raise fixed taxes in the model from 200 to 201. 
Working through the algebra, this comes to 0.4Y = 679.2, or Y = 1,698. So an 
increase in taxes of 1 has reduced GDP by 2, and the multiplier is -2.

iii. From the formula in the appendix, the tax multiplier is 
\[ -\frac{b}{1 - b(1 - t)} = -\frac{0.8}{1 - 0.8(1 - 0.25)} \]
\[ = -\frac{0.8}{1 - 0.8(0.75)} = -\frac{0.8}{1 - 0.6} \]
\[ = -\frac{0.8}{0.4} = -2 \]

To raise GDP by 100, the government can (a) raise G by 40, and the multiplier 
of 2.5 will do the rest, or (b) lower taxes or raise transfer payments by 50, and 
the multiplier of -2 will do the rest.

Question 2 on page 240 (10 points)
Answer: There are different ways to answer this problem.
(a) If you have already answered Question 1, note that the government wishes to 
raise GDP by 100, and that the multiplier for G is 2.5. Therefore the increase 
in G that is needed is 100/2.5 = 40, and so G should be 520.
(b) The problem can be solved from the beginning. Again, Y = C + I + G + (X – 
IM), but in this case, Y is known to be 1800, while G is unknown.
C = 120 + 0.8DI
DI = Y – T
DI = Y – (200 + 0.25Y)
DI = 0.75Y – 200
C = 120 + 0.8(0.75Y – 200)
C = 120 + 0.6Y – 160
C = 0.6Y – 40
1800 = 0.6(1800) – 40 + 320 + G – 80;
1800 = 1080 – 40 + 320 + G – 80
G = 520.

Question 3 on page 240 (10 points)
Answer: (a) Y = C + I + G + (X – IM)
\[ C = 0.9(Y - T) \]
\[ C = 0.9[Y - (1/3)Y] \]
\[ C = 0.9[(2/3)Y] \]
\[ C = 0.6Y \]
\[ Y = 0.6Y + 100 + 540 - 40 \]
\[ Y = 0.6Y + 600 \]
\[ 0.4Y = 600 \]
\[ Y = (1/0.4) \times 600 \]
\[ Y = 2.5 \times 600 = 1500 \]

Budget deficit = \( G - T \)
\[ = 540 - [(1/3) \times 1500] \]
\[ = 540 - 500 \]
\[ = 40 \]

(b) Since the budget deficit in part a is 40, the government would reduce its purchases by 40, to 500.

Repeating the steps above, but now with \( G = 500 \):
\[ Y = 0.6Y + 100 + 500 - 40 \]
\[ Y = 0.6Y + 560 \]
\[ 0.4Y = 560 \]
\[ Y = (1/0.4) \times 560 \]
\[ Y = 2.5 \times 560 = 1400 \]

Budget deficit = \( G - T \)
\[ = 500 - [(1/3) \times 1400] \]
\[ = 500 - 466 \frac{2}{3} \]
\[ = 33 \frac{1}{3} \]

GDP falls by 100, to 1,400. That drop reduces tax receipts, which are one-third of GDP, by 33 \( \frac{1}{3} \) (to 466 \( \frac{2}{3} \)). So in the new equilibrium, the deficit has fallen by only 6 \( \frac{2}{3} \) (to 33 \( \frac{1}{3} \)), not by the full 40 in lower spending. Although \( G \) fell by the amount of the deficit, this in turn caused \( Y \) to fall, which in turn lowered taxes, and the deficit persisted.

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**Topic:** Money and banking system

**Question 1 on page 260 (5 points)**

**Answer:** Under those conditions, the money multiplier is \( 1/0.10 \), or 10, so an infusion of $12 million into reserves will support an increase in money of $120 million.

**Question 2 on page 260 (5 points)**

**Answer:** With a reserve ratio of 25 percent, the money multiplier is \( 1/0.25 \), or 4; the money supply would rise by $48 million. With a reserve ratio of 100 percent, the money multiplier is \( 1/1 \), or 1; the money supply would rise by $12 million.
Question 3 on page 260 (10 points)
Answer:

<table>
<thead>
<tr>
<th></th>
<th>(a) Assets</th>
<th>(b) Assets</th>
<th>(c) Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liabilities</td>
<td>Reserves -100</td>
<td>Deposits -100</td>
<td>Deposits +100</td>
</tr>
<tr>
<td>Hometown Bank</td>
<td>Reserves -500</td>
<td>Deposits -500</td>
<td></td>
</tr>
<tr>
<td>Big City Bank</td>
<td>Reserves +500</td>
<td>Deposits +500</td>
<td></td>
</tr>
<tr>
<td>All Banks</td>
<td>Reserves no change</td>
<td>Deposits no change</td>
<td></td>
</tr>
</tbody>
</table>

a. In question 3(a), there is no initial effect on the money supply, since deposits of $100 are replaced with cash in circulation. However the bank is now deficient in reserves by $87.50, so eventually the money supply will fall by 8 times this, or $700.

b. Similarly in 3(b), there is no initial change in the money supply, but there are now excess reserves of $87.50, so eventually the money supply will rise by $700.

c. No change. for the banking system as a whole, neither reserves nor deposits have changed.

Question 4 on page 260 (10 points)
Answer:

a. In question 3(a), there is no initial effect on the money supply, since deposits of $100 are replaced with cash in circulation. However the bank is now deficient in reserves by $87.50, so eventually the money supply will fall by 8 times this, or $700.

b. Similarly in 3(b), there is no initial change in the money supply, but there are now excess reserves of $87.50, so eventually the money supply will rise by $700.

c. No change. for the banking system as a whole, neither reserves nor deposits have changed.